The European North

to over 344 billion tons, which is about half of the total coal reserves in the European part of the USSR. Among the largest oil and gas deposits that have been found are those of Ukhta, the Upper Izhma and Central Pechora. Recently, new deposits of light petroleum have been discovered in the district of Lemyu- Savinobors[illegible]. The natural gas deposits of the Upper Izhma (Verkhne Izhemskoye) have considerable reserves. It contains over 93% methane. Quite recently the new Dzhebol deposit of natural gas was found in the district of the Pechora-Ilychskiy State Reservation (Komi ASSR) which exceeds Verkhne Izhemskoye (Upper Izhma) in quantity. Lumber is the principal wealth of the European North. The woods have an age of 120 to 180 years. The general geological reserves of peat amount to 26 billion tons (calculated as air-dried) equal to 53% of the entire peat reserves of the European USSR. Among them are

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The European North

the biggest deposits, such as the Ulomskoye II in the Vologda Oblast', occupying an area of 102,000 hectares, but the extraction is poor and amounts to only 1 % of the All-Union output. Highly mechanized peat enterprises have been established only in the Vologda Oblast'. The oil shale deposits amount to about 13% of the entire supplies of the RSFSR European part. The principal layers are located in the basins of the rivers Ayyuva, the right tributary of the Izhma, and Sysola. Deposits of manganese ore were discovered in the upper parts of the Malyy Patok, a tributary of the Shugara, while chromite and the ore of rare metals - molybdenum and tungsten - was found in the Polar Urals. Layers of zinc-lead ore and copper were discovered in the Ilych River basin. Lead and zinc deposits were noted on a number of islands, including Vaygach and Novaya Zemlya. The supplies of gypsum and limestone are calculated to reach hundreds of million of tons but are at present utilized

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only to a small extent. Only clay is being exploited on a broad scale for bricks. The author emphasizes that during the years of the Soviet regime, dairy, husbandry, reindeer breeding and flax cultivation have become an important factor. Much work was done in melioration, expansion of the seeded area, raising crop capacity, increase of live-stock and establishing a material and technical base. Lumber cutting is increasing as compared with the average in the RSFSR. By 1965, the European North will yield 60 million cubic meters of lumber yearly. A more uniform distribution of the lumber industry is planned, also to bring it nearer to the sources of raw material. The Pechora basin forest areas, holding a supply of 1,200 millions of cubic meters of lumber, will be involved in the economic turnover, the Vychegda basin with 700,000,000 cub.m. and the Mezen' basin with 500,000,000 cub. m. For

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the transportation of timber it is planned to build a 220 km railroad from Mikun' to Koslan, and to continue the building of the Gayno-Kayskaya, Mekhren'gskaya, Shonashskaya, Yertsevo and Monzenskaya wide-gage railroads. This will create an outlet for the lumber to the south. For the delivery of lumber to the Arkhangel'sk industrial center the timber carrying railroad Leshukonskoye - Arkhangel'sk will be built. The sawing and woodworking industry will also experience a further development. New sawmills will be erected principally at the intersections of large floatable rivers and railroads, and along the Volga-Baltic water way. The Zhemartskiy, Monzenskiy, Pechorskiy and Sudskiy domostroitel'nyy kombinaty (Zhemartskiy, Monzenskiy, Pechora and Suda Housbuilding Combines) as well as the Shangal'skiy, Sheksninskiy derevopererabatyvayushchiye kombinaty (Shangaly and Sheksna Wood-Reprocessing Combines) and others will be put into operation.

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The second unit of the Arkhangel'skiy and the Kolasskiy tsellyulozno-bumazhnyye kombinat (Arkhangel'sk and Kotlas Cellulose-Paper Combines) now under construction, will be put in exploitation. The Solombal'skiy, Sukhonskiy and Sokol'skiy tsellyulozno-bumazhnyye kombinaty (Solombal'skiy, Sukhona and Sokol'skiy Cellulose-Paper Combines) will be expanded and reconstructed, and building will be begun of the Syktyvkar and Pechora Combines. During the 7-year Plan the output of cardboard in the Kray will increase almost 59 times. The Onezhskiy and Arkhangel'skiy gidroliznyye zavody (Onega and Arkhangel'sk Hydrolysis Plants) will be expanded and re-built and will considerably increase the production of alcohol, yeasts and furfurole. The Pechora coal basin will likewise experience further development: by the end of the 7-Year Plan several million tons more coal than in 1958 will be recovered here; building of

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coal mines at Khal'mer-Yu and Yun-Yakha will be sped up. They produce coking coal of the "K" and "PS" brand. It is intended to recover coal by open-pit mining at the recently prospected Nechensk deposit which is 25 km away from the Inta deposit. Much attention is also being paid to the development of gas deposits. Beginning with 1965, gas from the Dzhebol deposit will be forwarded to the Urals by the main gas line Dzhebol - Perm'. It is intended to deliver up to 3.5 billion cubic meters over this line. The petroleum refinery industry will grow considerably. The raw material for it will be delivered by pipeline from the Tatar ASSR. Petroleum recovered direct in the European North will be re-processed at the Ukhtinskiy neftepererabatyvayushchiy zavod (Ukhta Petroleum Refinery Plant). The Cherepovetskiy metallurgicheskiy zavod (Cherepovets Metallurgical Plant) is being built, taking into account the latest achievements in engineering

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and technology. In contrast to the other metallurgical plants of the country, the Cherepovets blast furnaces will not work on iron ore, but on fluxed agglomerate containing up to 60 % iron. The article gives a detailed description of the blast-furnace plant, the operation of which has been fully automated. It is intended to erect in Cherepovets a large ironware plant and another blast-furnace plant. It is planned to considerably expand and to reconstruct the Mashinostroitel'nyy zavod "Severnyy Kommunar" (Machine Building Plant "Severnyy Kommunar") in Vologda, the Sudoremontnyy zavod "Krasnaya Kuznitsa" (Shiprepairing Yard "Krasnaya Kuznitsa") in Arkhangel'sk and the Pechorskiy sudoremontnyy zavod (Pechora Shiprepairing Plant). Large cement plants will be built or expanded in Vorkuta and Ukhta, in the Arkhangel'sk Oblast' and a milling installation in Cherepovets. The fishing, food and light industry will also experience a considerable upsurge. The

The European North

building of the Vologodskiy l'nokombinat (Vologda Flax Combine) will be continued, and the Krasavinskiy L'nokombinat (Krasavino Flax Combine) will be reconstructed. It is contemplated to establish, in Vologda, a new staple fiber cloth combine and a sewing machine plant, in Cherepovets - a knitted wear factory. The railroads Vorkuta - Kotlas - Konosha and Kirov - Leningrad have single-track connections. The Pechora RR is getting a second line at present, also individual sections of the Kirov - Leningrad RR. During the 7-Year Plan. the erection of 2nd lines on these RR will be continued. The reconstruction of the Volga-Baltic water way will be completed. The author further tells of the contemplated development of animal husbandry and the necessity of establishing a Ural - Pechora coal and metallurgical base. He also considers it expedient to continue building the railroad Konosha - Annenskiy Most - Lodeynoye Pole which would ensure

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a direct outlet for the Vorkuta coal to Leningrad and improve transportation for the Pechora Metallurgical Plant. There are 6 photographs and 1 map.

ASSOCIATION: Gosplan RSFSR (Moscow)

Card 10/10

POLYAKOV, A.S.

Charge method applicable to nonequipotential conductors.
Vop.razved.geofiz. no.4:23-50 '64.

(MIRA 19:1)

POLYAKOV, Andrey Sergeyevich; RODIONOVA, F.A., red.; ZAYTSEVA, K.F., red.kart; MAKHOVA, N.N., tekhn. red.

[Geography of the branches of the national economy of the U.S.S.R. in the seven-year plant] Geografiia otraslei narodnogo khoziaistva SSSR v semiletnem plane; posobie dlia uchitelei. Moskva, Uchpedgiz, 1962. 207 p. (MIRA 16:5)
(Russia--Industries)

POLYAKOV, A. V.

N. T. GUDTSOV, A. N. BEKOVA, S. A. KAZEEV and A. V. POLYAKOV

C. A. Vol. 34. 1602-1

"The effect of special elements on the properties of chromium-silicon-vanadium high-speed steel" N.T. Gudtsov, A.N. Bekova, S.A. Kazeev and A.V. Polyakov. Metallurg 14, No. 1, 51-61 (1939).

Addns. of Mo (0.35-3.18%), Co (0.66-6.3%), Ti (0.12-0.38%) and a Cb-Ta mixt. (0.1-2.0%) were made to steel contg. C 1.0-1.2, Cr 10-13, Si 0.9-1.6 and V 2.0-2.5%. Mo and Ti improved the cutting properties; Co and the Cb-Ta mixt. showed no effect. Steel contg. 3.18% Mo was equal or slightly superior to a W 18, Cr 4 and V 1% steel.
H. W. Rathmann.

POLYAKOV, Aleksandr Vasil'yevich; KIRPICHENKO, M.M., red.; CHOTIYEV, S., tekhn. red.

[Right-flank of the seven-year plan.] Pravoflangovyi semiletki. Frunze, Kirgizskoe gos. izd-vo, 1960. 34 p. (MIRA 15:4)
(Frunze--Steel industry)
(Socialist competition)

L 24683-65 EWT(m)/EPF(c)/EWP(j)/T Pc-4/Pr-4 RM
ACCESSION NR: AT5000965 S/0282/64/000/010/0001/0001

34
B

SOURCE: Ref. zh. Khimicheskoye i kholodil'noye mashinostroyeniye. Otd. vyp., Abs. 10.47.12

AUTHOR: Ispir'yan, E. M.; Podval'nyy, S. L.; Polyakov, A. V.

TITLE: Compiling a mathematical description of the emulsion polymerization process and using it in an automated control system

CITED SOURCE: Tr. Labor. khimii vysokomolekul. soyedineniy. Voronezhsk. un-t., vyp. 2, 1963, 196-203

TOPIC TAGS: emulsion polymerization, butadiene polymerization, styrene polymerization, polymerization control, automatic control system

TRANSLATION: Statistical data compiled at an active plant were processed mathematically in an effort to optimize the industrial process of emulsion polymerization of butadiene with styrene. An analysis of the selected input parameters of the process, giving due consideration to its technological characteristics in the form of a coefficient of mutual correlation, indicates that some

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L 24683-65
ACCESSION NR: AR 000965

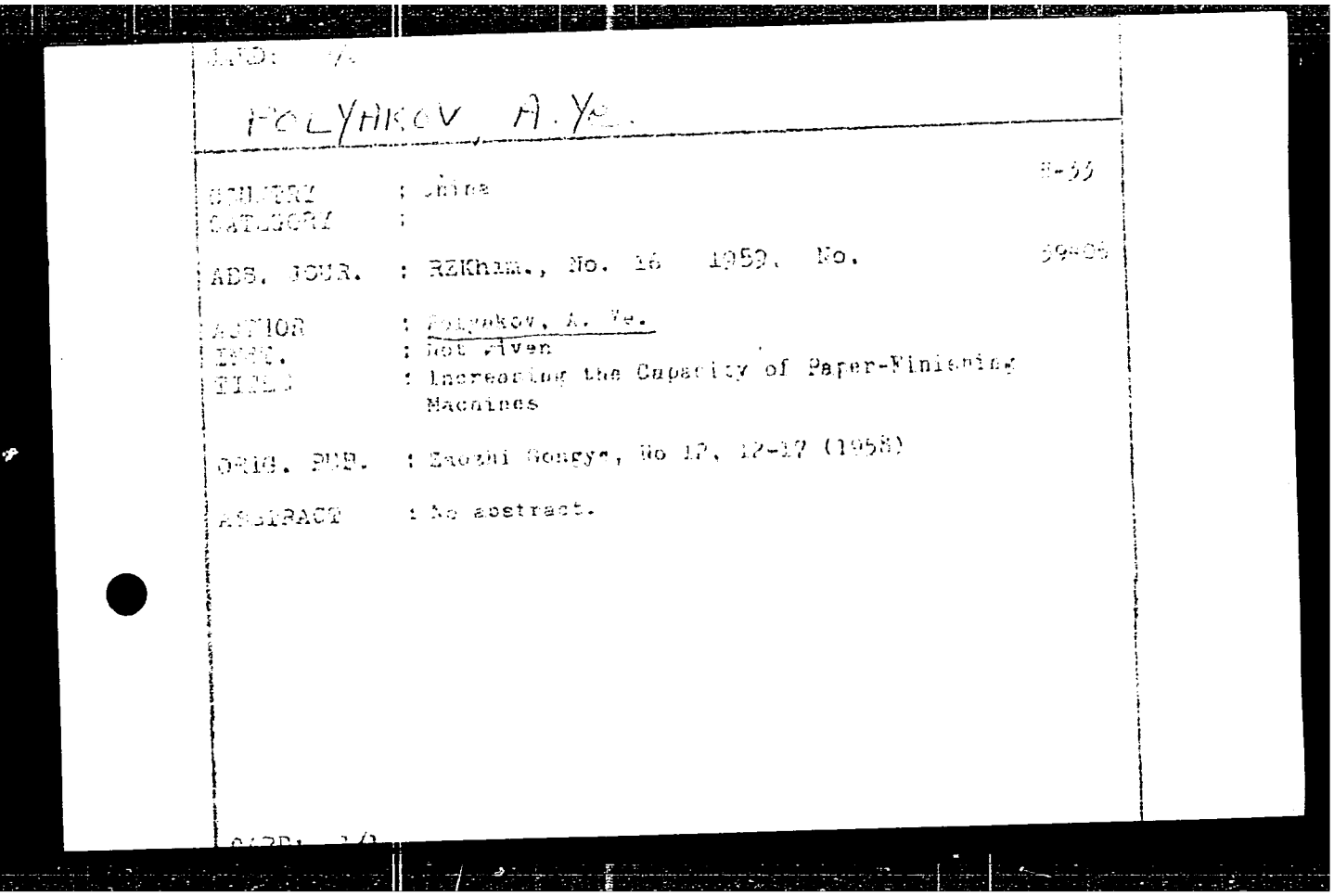
parameters can be regulated and others should be rigidly stabilized. These parameters govern the final constants and the latter determine, in turn, the optimal pattern of the process, i.e. conversion and plasticity of the rubber. The authors evolved linear equations correlating initial and final constants. These can be solved during the process by a computer, thus facilitating automated regulation of a polymerization process. The proposed system makes it possible to optimize the process of emulsion polymerization, while necessary adjustments and refinements can be effected while the process takes place. Bibl. with 2 titles. G. Chernyy

SUB CODE: IE, GC ENCL: 00

Card 2/2

POLYAKOV, A.Ye., inzhener

Device for removing steam turbine diaphragms while repairing by scraping. Izobr. v SSSR 2 no.1:17 Ja '57. (MLRA 10:4)
(Steam turbines)



AUTHOR: POLYAKOV, A. Ye.

COUNTRY : China
CATEGORY :

ABS. JOUR. : RZKhim., No. 16 1959, No. 59405

AUTHOR : Polyakov, A. Ye.
INST. : Not Given
TITLE : Increasing the Capacity of Paper-Finishing Machines

ORIG. PUB. : Zaozhi Gongye, No 12, 12-17 (1958)

ABSTRACT : No abstract.

CARD: 1/2

LU TIN'-TSZYUN' [Lu T'in-chün], inzh-tekhnolog; POLYAKOV, A.Ye., inzh.

Production of woodpulp from birch wood by the sulfite process in the Chinese People's Republic. Bum.prom. 34 no.10:25-28 O '59. (MIRA 13:2)

1. Glavbumprom Ministerstva legkoy promyshlennosti Kitayskoy Narodnoy Respubliki.
(China--Woodpulp industry)

L 65086-65 EWT(m)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)
ACCESSION NR: AP5021227 MJW/JD/HM UR/0125/65/000/008/0075/0075
621.791.75:546.621:625.2

AUTHOR: Metel'skiy, A.N. (Engineer); Poritskiy, M.P. (Engineer); Steblovskiy, B.A. (Engineer); Vyshnikov, I.Ye. (Engineer); Polyakov, A.Ye. (Engineer)

TITLE: Welding of sliding freightcar roofs made of AMg6 alloy

SOURCE: Avtomaticheskaya svarka, no. 8, 1965, 75

TOPIC TAGS: sliding freightcar roof, freightcar roof, transloading, freight loading, argon arc spot welding/AMg6 aluminum-magnesium alloy

ABSTRACT: To facilitate transloading operations and shorten their time, the Altay Rolling Stock Building Plant, in collaboration with the Ye. O. Paton Institute of Electric Welding, has designed and built a boxcar with a sliding roof (Fig. 2) made of the AMg6 aluminum-magnesium alloy. The roof (Fig. 1) consists of two parts each of which can be slid by means of power drive in either direction, thus making possible the mechanized loading and unloading of large shipments and bulk freight. Each half-roof consists of a frame atop a plating of 2 mm thick sheets of AMg6 aluminum-magnesium alloy. The welding of these sliding roofs was performed with the aid of a nonconsumable (tungsten) electrode in an argon atmosphere. The frame

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L 65086-65

ACCESSION NR: AP5021227

was assembled and welded in a special positioner equipped with locators and adjustable clamps for aligning the ten trapezoidal arches. The plating sheets were simultaneously welded together and welded to the arches, in the following regime: welding current I_w = 130-200 a; tungsten electrode of 3-5 mm diameter; filler wire of 3-5 mm diameter; Q_{argon} = 8-10 liters/min. In addition, the plating sheets were attached to the arches by means of manual argon-arc spot (diameter 12 mm) welding spaced 150 mm apart. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 02 SUB CODE: IE, GO

NO REF SOV: 000 OTHER: 000

Card 2/4

L 65086-65

ACCESSION NR: AP502[illegible]227 ENCLOSURE: 01

Fig. 1. Schematic of slide of the half-roof

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L 65086-65

ACCESSION NR: AP5021127

ENCLOSURE: 02

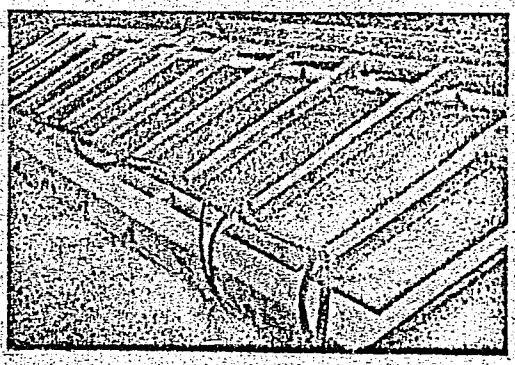

Fig. 2. Welded frame of half-roof

MJR

Card 4/4

POLYAKOV, A.Ye.

Fourth Plenum of the Central Administration of the Scientific and Technical Society. Gidroliz. i lesokhim.prom. 18 no.4:28-29 '65.
(MIRA 18:6)

POLYAKOV, A.Ye.

It is necessary to use industrial capacities to the fullest extent. Gidroliz. i lesokhim.prom. 17 no.1:5-7 '64. (MIRA 17:4)

1. Gosplan SSSR.

Polyakov, A. Ye.

COMMUNIST CHINA / Chemical Technology. Cellulose and Its Derivatives. Paper. H-33

Abs Jour: Ref Zhur-Khimiya, No 14, 1959, 51993.

Author : Polyakov, A. Ye.
Inst : Not given.
Title : Continuous Grinding of Masses Employing Rolls.

Orig Pub: Zaozhi gongye, 1958, No 7, 4.

Abstract: Presented and described is a process scheme, in accordance with which the productivity is increased by 15-20% and the power requirements are reduced by 10-15%.

Card 1/1

H-197

L 07585-67 EWT(1)/EWP(m) · RM

ACC NR: AP6030425 SOURCE CODE: UR/0420/66/000/006/0014/0017

3/

AUTHOR: Yershov, V. N.; Polyakov, A. Ye.

ORG: None

TITLE: Effect which nonuniformity in the oncoming flow has on losses in cascades with blades which have a low aspect ratio

SOURCE: Samoletostroyeniye i tekhnika vozdushnogo flota, no. 6, 1966, 14-17

TOPIC TAGS: turbine cascade, compressor blade, secondary flow, nonuniform flow

ABSTRACT: Experimental data are given on compressor cascades with various degrees of nonuniformity in the oncoming flow. Three cascades were tested in all: two modifications (λ=0.5 and λ=1) with a chord b=50 mm and one modification (λ=0.5) with a chord of 100 mm. The leading edges of the blades were rounded and the trailing edges were beveled. The curvature of the profile was 45° and all cascades were made with the blades set at an angle of 52°30' and a relative spacing b/t=2. Flat cut-off plates were used for changing the aspect ratio and for eliminating the boundary layer on the walls of the casing. Nonuniformity in the field at the input resulted in thin strands close to the leading edges of the cut-off plates in a direction normal to the velocity of the oncoming flow. Variation in the number of strands and the distance between them was determined by the shape of the velocity profile. The results show

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an increase in losses with nonuniformity in the oncoming flow. The region of propagation of secondary flows is practically independent of the degree of nonuniformity in the oncoming flow although the intensity of secondary flows increases with nonuniformity resulting in higher losses. The experimental data indicate that ordinary theoretical methods should not be used for determining the characteristics of blades with a low aspect ratio. Orig. art. has: 5 figures.

SUB CODE: 13/ SUBM DATE: None

S/137/63/000/002/003/034
A006/A101

AUTHOR: Polyakov, A. Yu.

TITLE: Thermodynamic foundations of using a vacuum in steel and alloy production processes

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 2, 1963, 23, abstract 2A100 (In collection: "Vakuumn. metallurgiya", Moscow, Metallurgizdat, 1962, 7 - 75)

TEXT: The author analyzes general regularities in the use of a vacuum in steel-making processes; reactions of oxide reduction with carbon; deoxidation processes in a vacuum; degassing of metal, distillation of liquid alloy components in vacuum melting processes, and interaction of liquid metal with refractory lining. Brief information is given on the basic correlations determining ΔF^{o} of the reactions with the participation of gases or solutions. The use of a vacuum causes a shift of the reaction equilibrium only in cases when the processes take place with the participation of a gaseous phase and are accompanied by an increasing amount of gas. On the example of reducing Cr and V oxides the

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Thermodynamic foundations of... S/137/63/000/002/003/034
A006/A101

author analyzes the peculiarities in carbon-thermal processes of vacuum metallurgy. It is noted that a 1 - 2 mm Hg rarefaction is required to raise the deoxidizing capacity of C in liquid steel. This is supposed to be connected with a high ratio of P_{CO} in the gas bubble to P_{CO} in the atmosphere. The reduction of Al and Si from alumina and silica by carbon can not noticeably develop in a vacuum, since P_{CO}, developed in these reactions, are not sufficient to overcome the ferrostatic pressure and surface tension forces. Degassing processes in a vacuum are analyzed in detail. It is shown that in the absence of stable nitrides in the metal vacuum treatment causes a decrease of the N content due to the developing decarbonization and liberation of N_2 in the bubbles. The analysis of the process of evaporation in a vacuum of alloy impurities shows that As evaporation is connected with high Fe losses. On the other hand, S evaporation from binary alloys is possible. In vacuum arc remelting, 50% Sn, Cu, Mn is eliminated; Pb is fully removed.

A. Vertman

[Abstracter's note: Complete translation]

Card 2/2

S/137/62/000/012/005/085
A006/A101

AUTHORS: Samarin, A. M., Polyakov, A. Yu., Belkov, S. F., Okorokov, G. N.

TITLE: The effect of vacuum arc remelting upon the quality of bearing steel

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 12, 1962, 45, abstract 12V286 ("Tr. N.-i. i eksperim. in-ta podshipnik. prom-sti", 1960, 1, (21) 41 - 54)

TEXT: The authors investigated the effect of vacuum arc remelting techniques upon the quality of bearing steels. Data are presented on the effect of electric conditions of the vacuum rarefaction, the magnitude of inflow and the strength of the solenoid magnetic field upon the quality of the ingots (changes in the chemical composition and completeness of metal refining). It was established that the use of vacuum arc remelting reduces contamination of bearing steels by non-metallic inclusions, and its gas saturation. It is noted that in the process of vacuum remelting Mn and Si content are somewhat reduced. It was established that the electromagnetic mixing of the pool entails the formation

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The effect of vacuum arc remelting upon...

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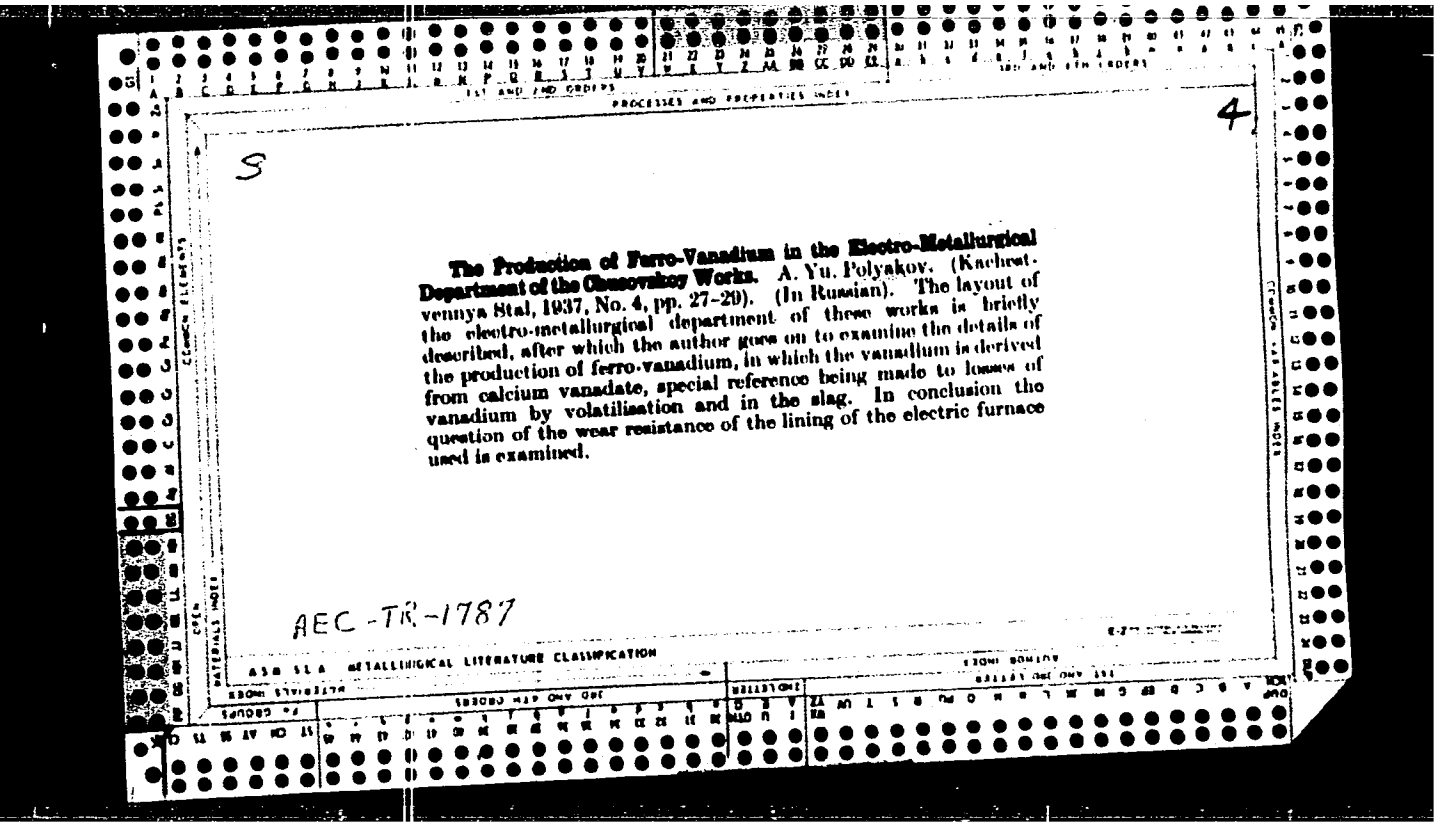
A006/A101

of pores in high-carbon steel ingots and does not affect metal refining. It is mentioned that O_2 and S are uniformly distributed over the height and diameter of the Sh15 steel ingot and that only in the zone of shrinkage cavities an increased O content is observed. The pressure in the melting space of the furnace varied within a range of 10^{-4} –5 . 10^{-2} mm Hg and did not affect the decrease in the O content and oxide inclusions. There are 5 references.

A. Savel'yeva

[Abstracter's note: Complete translation]

Card 2/2

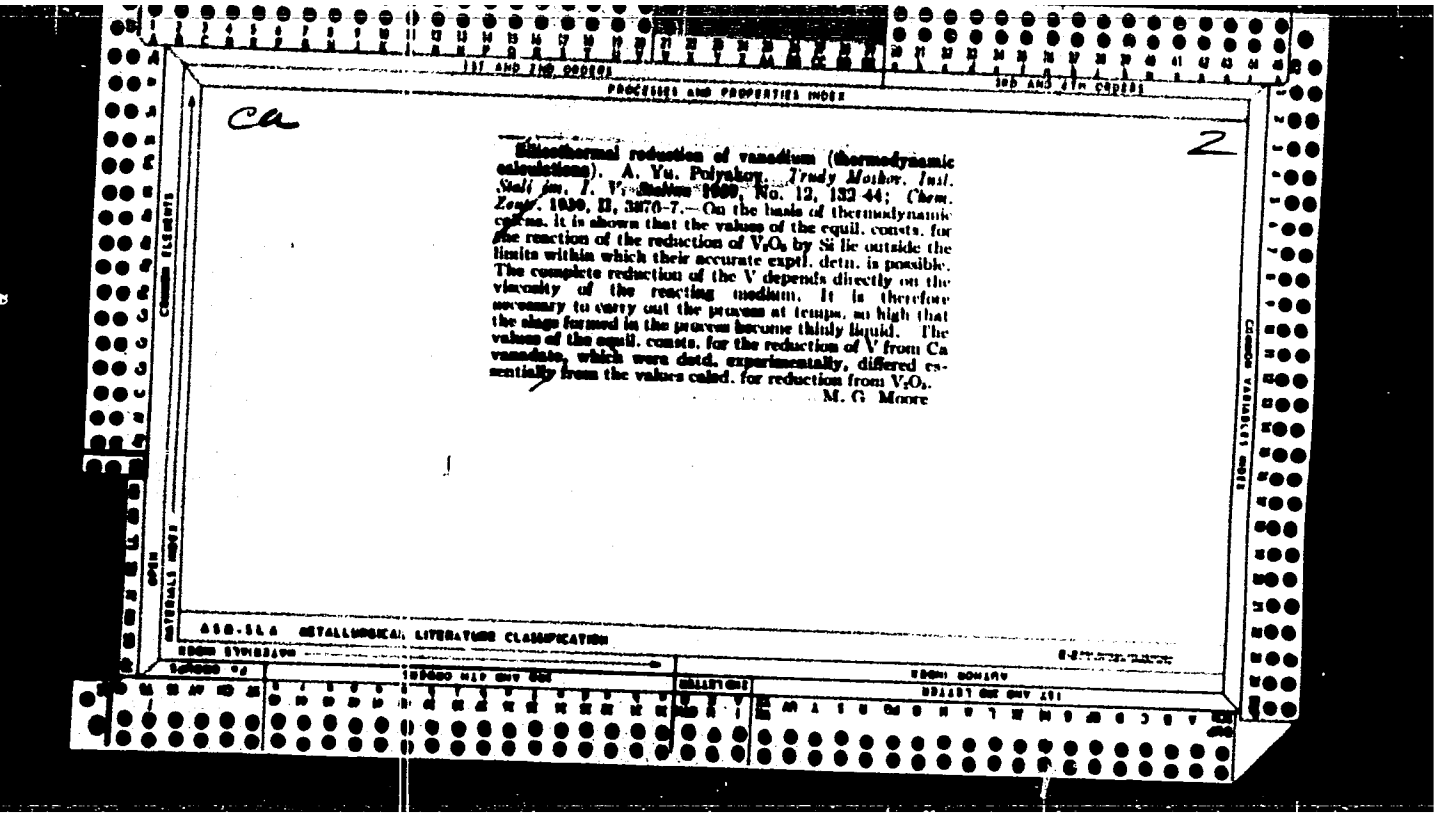


S

4

The Production of Ferro-Vanadium in the Electro-Metallurgical Department of the Chusovskoy Works. A. Yu. Polyakov. (Kachestvennaya Stal, 1937, No. 4, pp. 27–29). (In Russian). The layout of the electro-metallurgical department of these works is briefly described, after which the author goes on to examine the details of the production of ferro-vanadium, in which the vanadium is derived from calcium vanadate, special reference being made to losses of vanadium by volatilisation and in the slag. In conclusion the question of the wear resistance of the lining of the electric furnace used is examined.

AEC-TR-1787

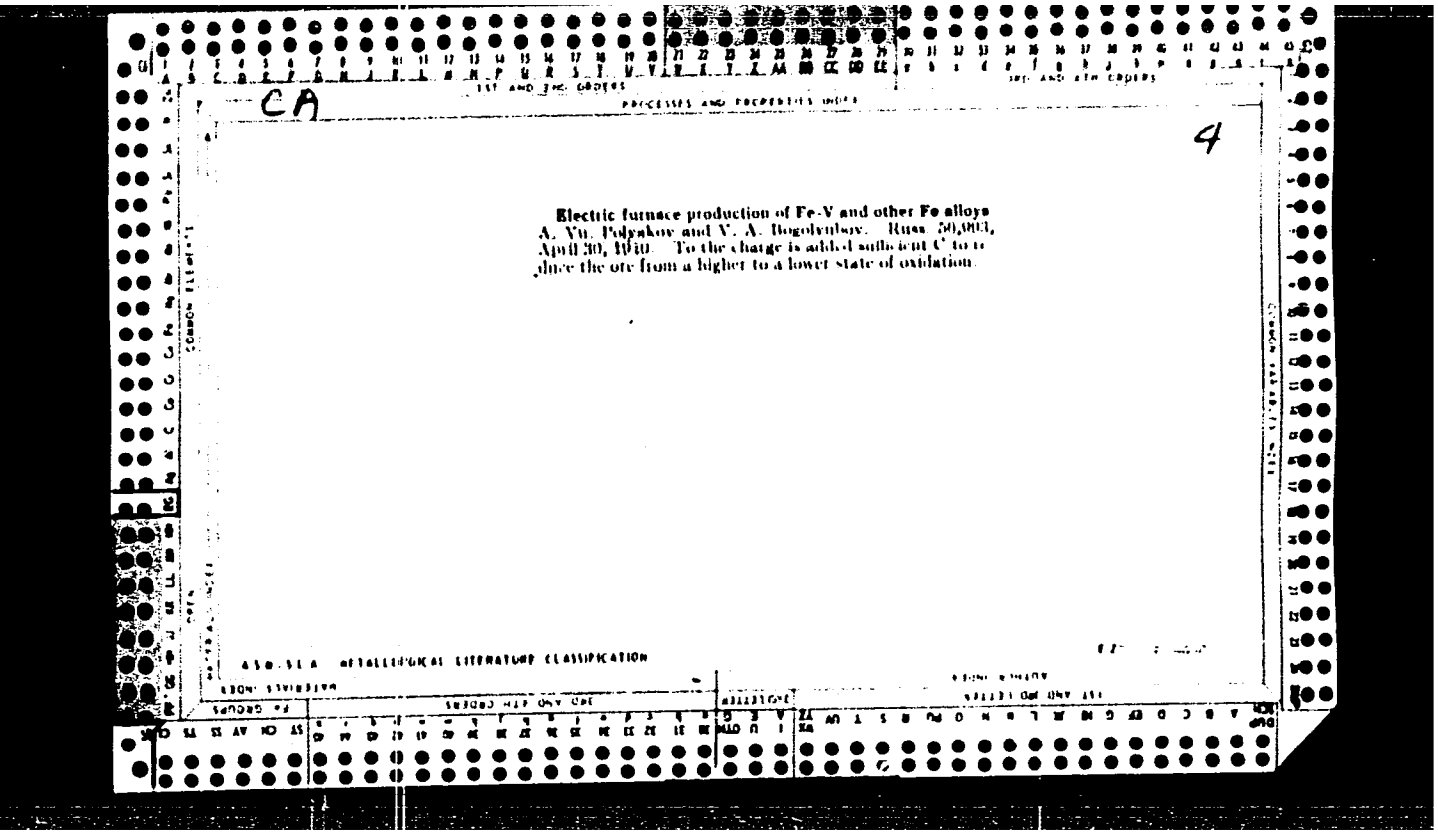


Ca

2

Silicothermal reduction of vanadium (thermodynamic calculations). A. Yu. Polyakov. *Trudy Mosk. Inst. Stali im. I. V. Stalina* 1939, No. 12, 132-44; *Chem. Zentr.* 1940, II, 3870-7.—On the basis of thermodynamic calcns. it is shown that the values of the equil. consts. for the reaction of the reduction of V_2O_5 by Si lie outside the limits within which their accurate exptl. detn. is possible. The complete reduction of the V depends directly on the viscosity of the reacting medium. It is therefore necessary to carry out the process at temps. so high that the slags formed in the process become thinly liquid. The values of the equil. consts. for the reduction of V from Ca vanadate, which were detd. experimentally, differed essentially from the values calcd. for reduction from V_2O_5.

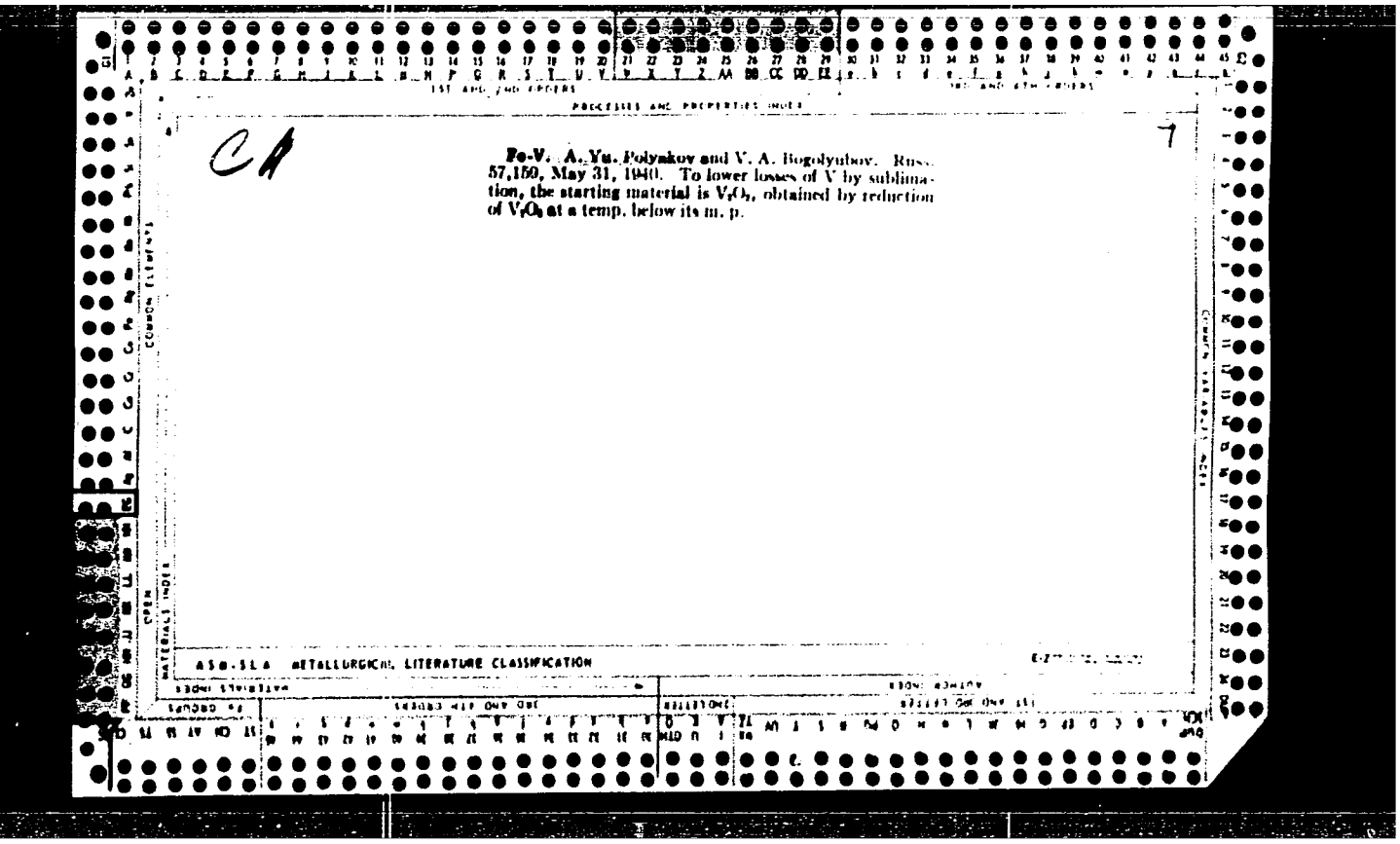
M. G. Moore



CA

4

Electric furnace production of Fe-V and other Fe alloys
A. Yu. Pulyakov and V. A. Bogolyubov. Russ. 50,803,
April 30, 1940. To the charge is added sufficient C to re-
duce the ore from a higher to a lower state of oxidation.

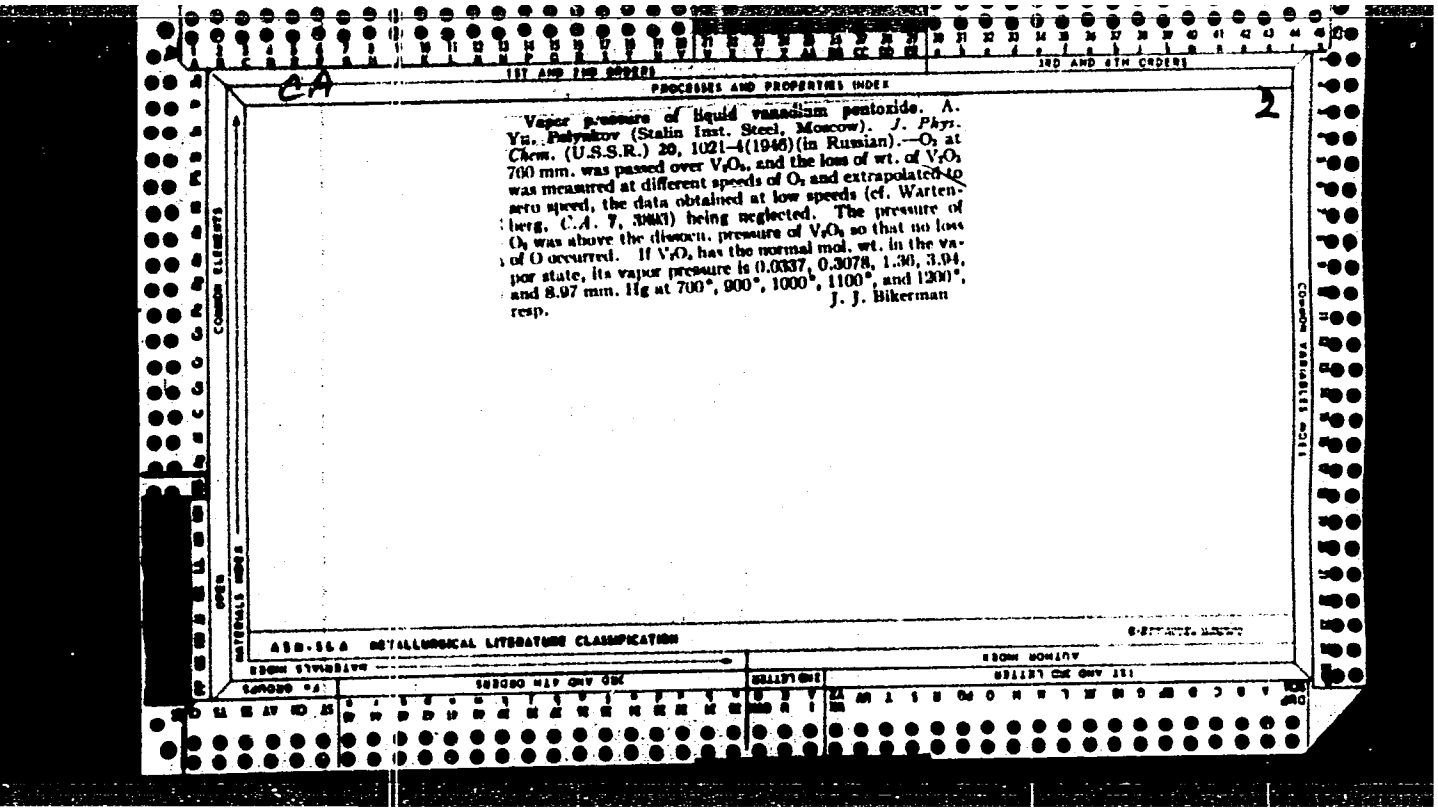


CA

7

Fe-V. A. Yu. Polyakov and V. A. Bogolyubov. Russ. 57,150, May 31, 1940. To lower losses of V by sublimation, the starting material is V_2O_3, obtained by reduction of V_2O_5 at a temp. below its m. p.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



CA

PROCESSES AND PROPERTIES INDEX

2

Vapor pressure of liquid vanadium pentoxide. A. Yu. Polyakov (Stalin Inst. Steel, Moscow). *J. Phys. Chem.* (U.S.S.R.) 20, 1021–4(1946)(in Russian).—O_2 at 700 mm. was passed over V_2O_5, and the loss of wt. of V_2O_5 was measured at different speeds of O_2 and extrapolated to zero speed, the data obtained at low speeds (cf. Wartenberg, *C.A.* 7, 3983) being neglected. The pressure of O_2 was above the dissocn. pressure of V_2O_5 so that no loss of O occurred. If V_2O_5 has the normal mol. wt. in the vapor state, its vapor pressure is 0.0337, 0.3078, 1.30, 3.94, and 8.97 mm. Hg at 700°, 900°, 1000°, 1100°, and 1200°, resp.

J. J. Bikerman

POLIAKOV, A. IU

**TT.448 (Solubility and activity of oxygen in iron and vanadium melts) Rastvorimost'i aktivnost' kisloro a v rasplavakh zheleza i vanadiia.
DOKLADY AKADEMII NAUK SSSR 85(6): 1313-1316, 1952

POLYAKOV, A. YU.

USSR/Engin
Metallurgy
Furnaces, Electric-Arc

Dec 1947

"Quantitative Determination of Status of Oxidized Slag in Electric-Arc Furnaces," A. M. Samarin, A. Yu. Polyakov, L. A. Shvartsman, Corr Members, Acad Sci USSR; Metal Inst imeni A. A. Baykov, Acad Sci USSR, 9 pp

"Izv Akad Nauk SSSR, Otdel Tekh Nauk" No 12

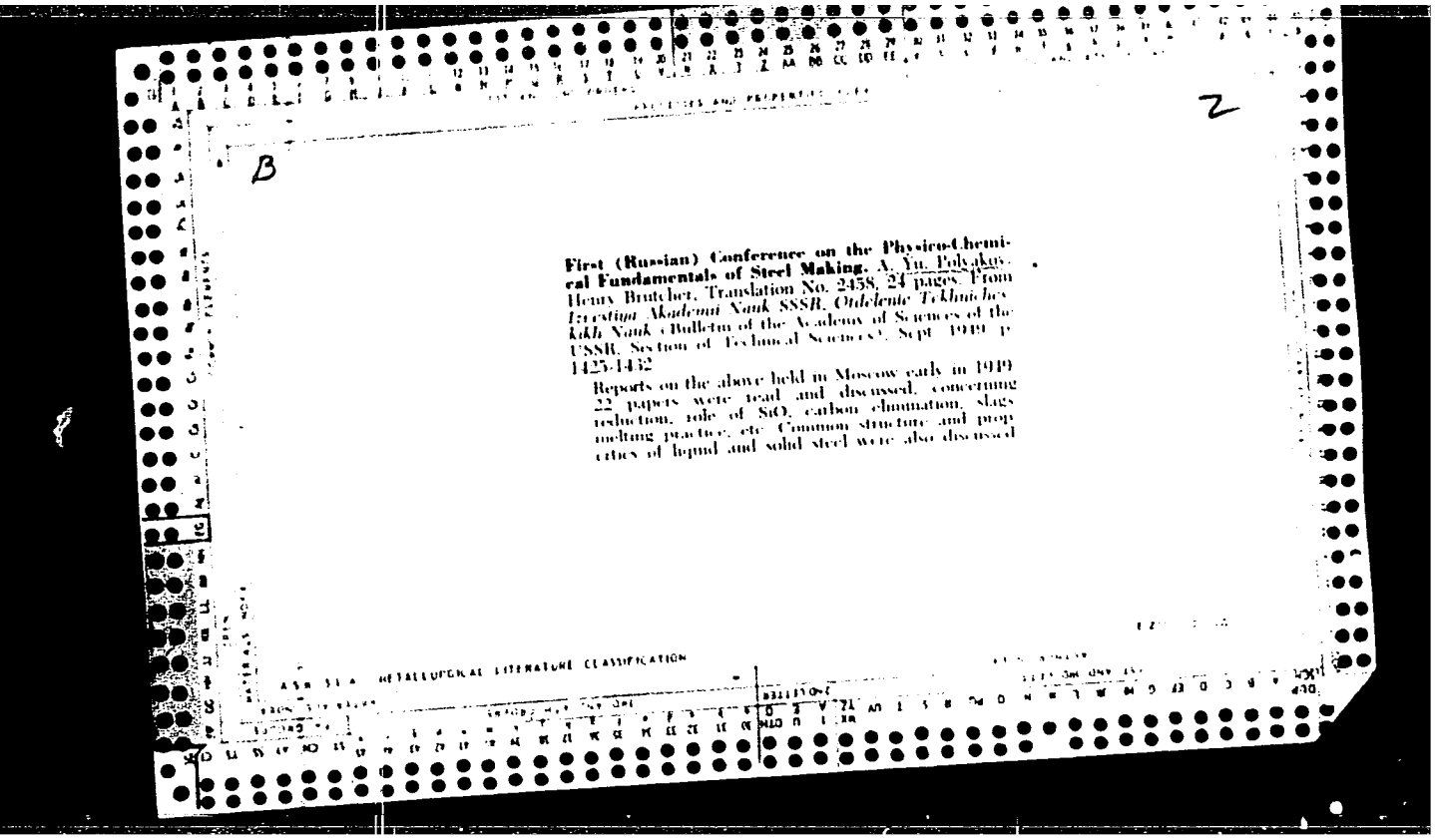
One of the more difficult contemporary tasks is to discover some method to determine amount of iron ore used during smelting in Martin furnaces, or the oxidizing period necessary in simple electric-arc furnace. Authors present results of their quantitative determination of necessary oxidation ability of slag, with aid of method they consider to be the most exact yet suggested. Submitted 15 Jul 1947.

PA 57T22

C#

9

Deoxidizing capacity of vanadium. A. M. Samarin and A. Yu. Polyakov (Acad. Sciences U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1949, 100–13.—Seven steel heats contg. V 0.64–1.25 and Si 0.14–1.86% were melted in a 50-kg. induction furnace and held at temps. ranging from 1520 to 1730°. The rate of oxidation of V and Si by air was detd. by taking periodic samples. The presence of Si delayed oxidation of V; very little V was oxidized until the Si content dropped to 0.1% or less. Upon oxidation, V appeared to form the spinel $FeO.V_2O_3$. From the equil. const. for oxidation of Si, the equil. const. for V was calcd. as $\log K_V' = -(21000/T) + 9.25$, where $K_V' = [\%V]^2/[\%FeO]^3$. For the reaction $V + 2FeO = 1/3(FeO.V_2O_3) + 2/3Fe$, $\Delta F^\circ = -90075 + 43.32T$. V is a considerably weaker deoxidizer in steel than is Si. H. W. R.



First (Russian) Conference on the Physico-Chemical Fundamentals of Steel Making. A. Yu. Polyakov. Henry Brutcher, Translation No. 2458, 24 pages. From *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Sept. 1949, p. 1425-1432

Reports on the above held in Moscow early in 1949. 22 papers were read and discussed, concerning reduction, role of SiO, carbon elimination, slags, melting practice, etc. Common structure and properties of liquid and solid steel were also discussed.

USSR/Chemistry - Vanadium, Reduction of Jan 49
Chemistry - Reduction, of Vanadium

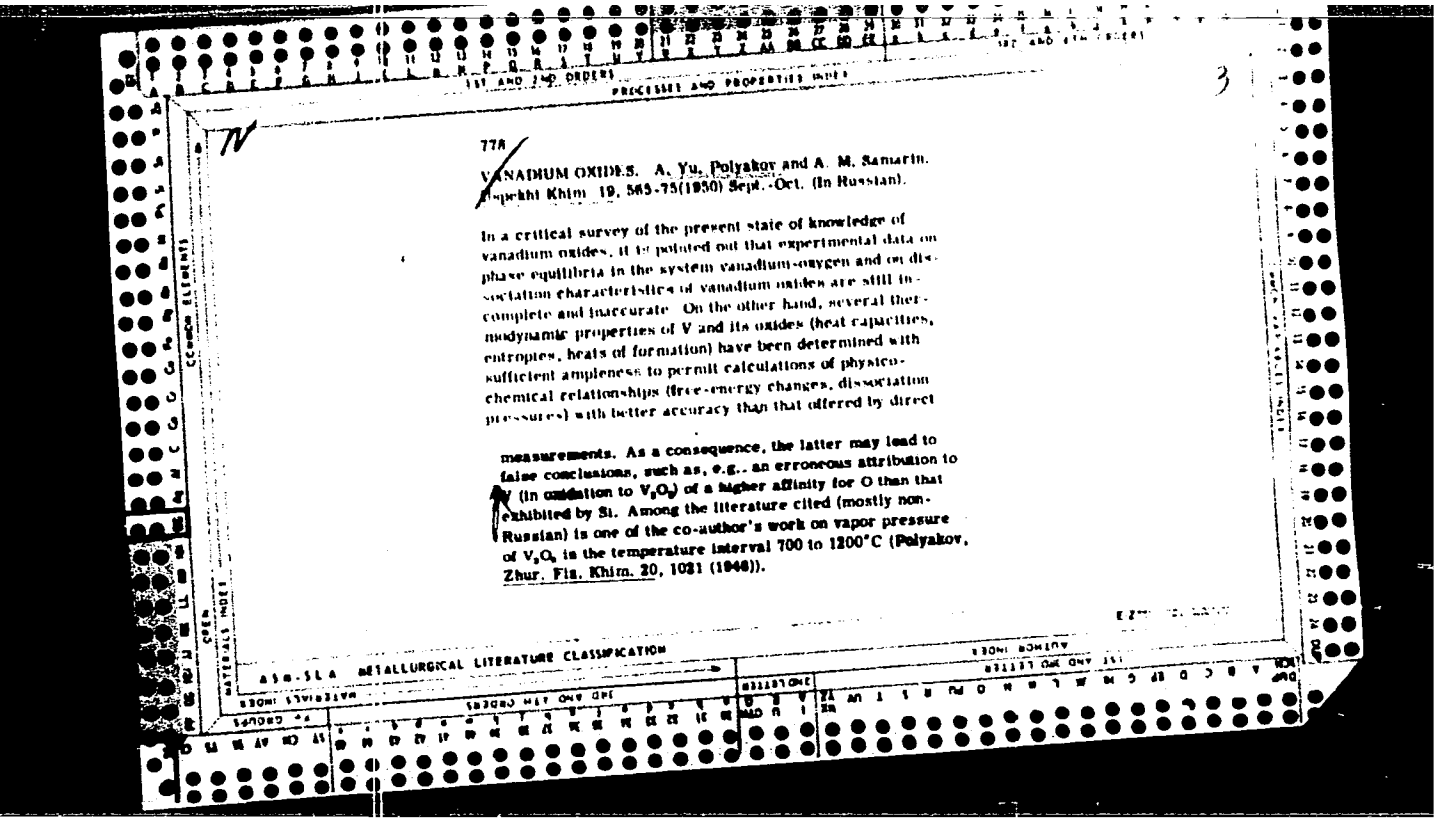
"Problem of the Reduction Ability of Vanadium," A. M. Samarin, Corr Mem, Acad Sci USSR, A. Yu. Polyakov, Inst of Metal imeni A. A. Baykov, Acad Sci USSR, 14 pp

"Iz Ak Nauk SSSR, Otdel Tekh Nauk" No 1

Attempts approximate, quantitative evaluation of vanadium's reducing ability by comparing its behavior with silicon, both having been dissolved in liquid iron during their slow oxidation by atmospheric oxygen in high-frequency electric furnace with 50-kg capacity.

[redacted]

24/49T10



77A

VANADIUM OXIDES. A. Yu. Polyakov and A. M. Samarin. Uspekhi Khim. 19, 565-75(1950) Sept.-Oct. (In Russian).

In a critical survey of the present state of knowledge of vanadium oxides, it is pointed out that experimental data on phase equilibria in the system vanadium-oxygen and on dissociation characteristics of vanadium oxides are still incomplete and inaccurate. On the other hand, several thermodynamic properties of V and its oxides (heat capacities, entropies, heats of formation) have been determined with sufficient ampleness to permit calculations of physicochemical relationships (free-energy changes, dissociation pressures) with better accuracy than that offered by direct measurements. As a consequence, the latter may lead to false conclusions, such as, e.g., an erroneous attribution to V (in oxidation to V_2O_5) of a higher affinity for O than that exhibited by Si. Among the literature cited (mostly non-Russian) is one of the co-author's work on vapor pressure of V_2O_5 in the temperature interval 700 to 1200°C (Polyakov, Zhur. Fiz. Khim. 20, 1021 (1946)).

POLYAKOV, A. YU.

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
General and Physical Chemistry

Reducing ability of vanadium. B. A. Karasev, A. Yu. Polyakov, and A. M. Samarin. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1952, 1794–1801; cf. *C.A.* 44, 6367g.—The reducing ability of V was examd. in connection with the effect of V on soly. and activity of O_2 dissolved in liquid Fe. In the exptl. installation equil. was attained between liquid Fe that contained V and the gas phase of H_2 and H_2O (complete description of the app. is given). V reduces the soly. of O_2 in liquid Fe and lowers the activity of O_2. V appears to be a weaker reducing agent than Si. Depending on the content of V in liquid Fe (the range examd. was from [illegible] to 2.8%) and consequently on the partial pressure of O_2 in the gas phase, the compn. of the oxide phase, formed by oxidation of Fe-carried V, also changes. Up to 2% V the compn. of the oxide phase varies from variable values up to VO_2.

Chemistry (3)

POLYAKOV, A. YU.

PA 248T91

USSR/Metallurgy - Steel, Gas Analysis Sep 52

"Determination of Oxygen, Nitrogen and Hydrogen in Hard Steel," R. A. Karasev, A. Yu. Polyakov

Iz Ak Nauk SSSR, Otdel Tekh Nauk, No 9, pp 1360-1368

Describes apparatus for detn of gases in steel by method of melting in vacuum. Installation is equipped with 15-kw high-frequency vacuum furnace. Analysis of extracted gas is performed by fractional freezing out of its components at temp of liquid N and measuring amount of these components in calibrated vols at room temp. Performance of installation is characterized by very small correction factor

248T91

for O and H and by high productivity -- 15-16 samples per day. Submitted by A. M. Samarin, Corr Mb Acad Sci USSR, 22 May 52.

(CA 47 no.15: 7370 '53)

248T91

POLYAKOV A. YU.

238T15

USSR/Chemistry - Vanadium

Aug 52

"Solubility and Activity of Oxygen in Molten Iron and Vanadium," R. A. Karasev, A. Yu. Polyakov and Corr Mem Acad Sci USSR A. M. Samarin, Inst of Metallurgy imeni A. A. Baykov, Acad Sci USSR

"DAN SSSR" Vol 85, No 6, pp 1313-1316

The results from the exptl detn of the deoxidizing capacity of V are presented. V lowers the solubility of O in liquid Fe and decreases its activity. V has a much lower deoxidizing capacity than Si.

238T15

FOL-4/45 04, 14, 4/0.

USSR/Chemistry - Metallurgy

Card 1/1 : Pub. 124 - 10/24

Authors : Karasev, R. A., Cand. of Tech. Sc.; and Polyakov, A. Yu.

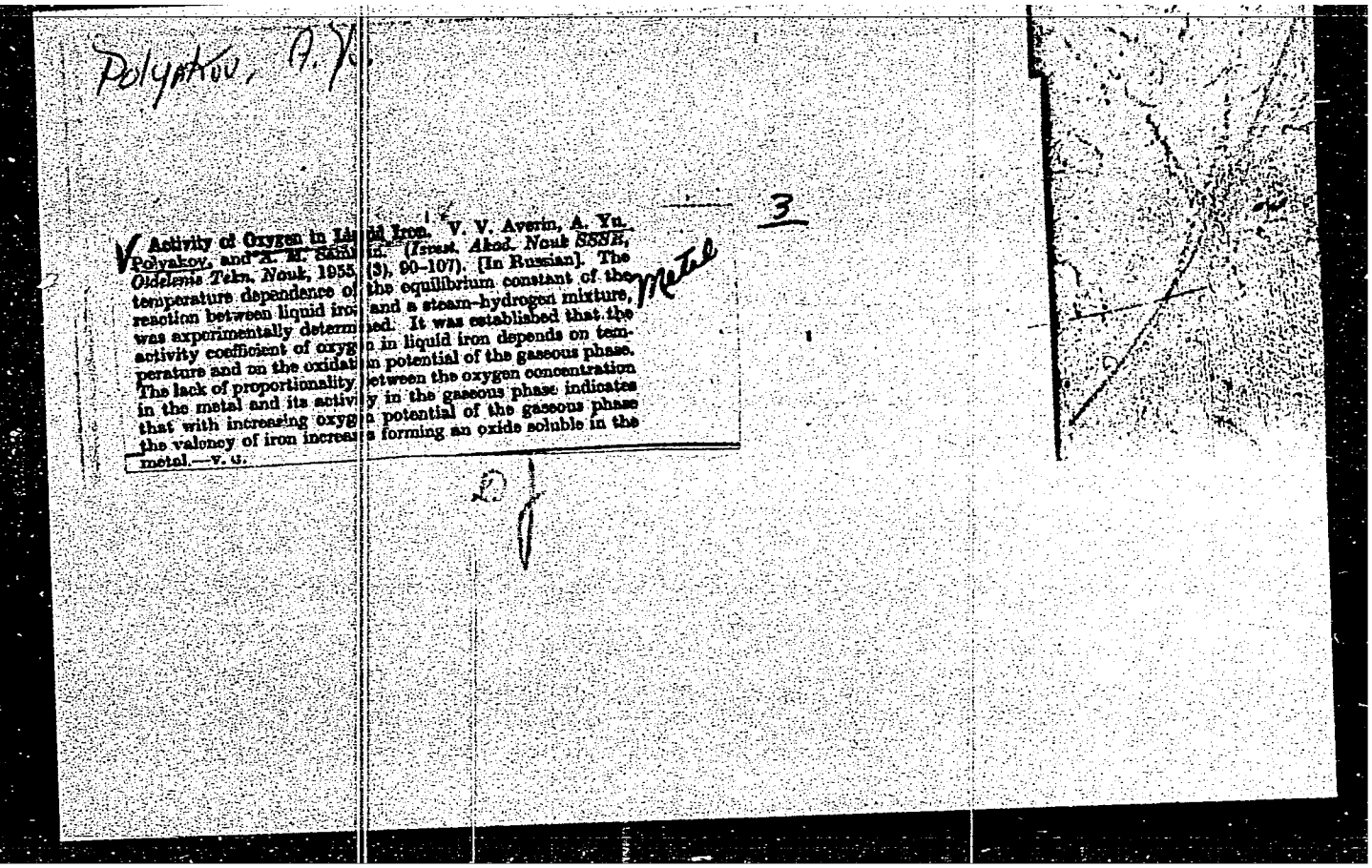
Title : Determination of gas contents in metals and alloys

Periodical : Vest. AN SSSR 11, 61-62, November 1954

Abstract : An industrial method for the determination of gas contents (hydrogen, oxygen, nitrogen) in steel and alloys is briefly described. This method is considered highly universal from the view point of the number of gases to be determined and is also very suitable for the analysis of various types of steel. A special rational system developed at the A. A. Baykov Metallurgical Institute of the Academy of Sciences USSR, which is used in conjunction with the above mentioned method, is described.

Institution : .....

Submitted : .....

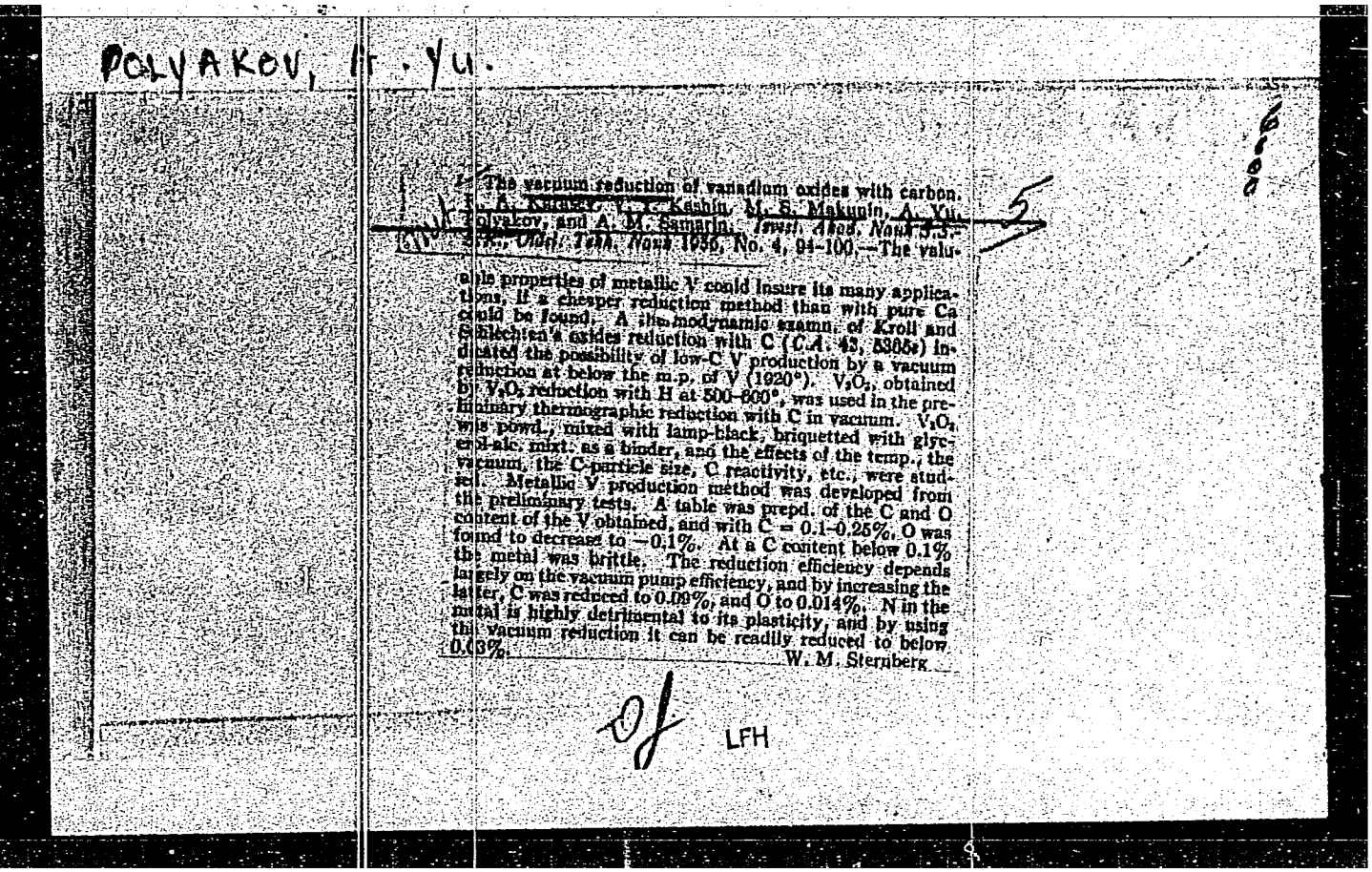


Polyakov, A. Yu.

3

Activity of Oxygen in Liquid Iron. V. V. Averin, A. Yu. Polyakov, and A. M. Samarin. (Izvest. Akad. Nauk SSSR, Otdelenie Tekn. Nauk, 1955, (3), 90–107). [In Russian]. The temperature dependence of the equilibrium constant of the reaction between liquid iron and a steam-hydrogen mixture, was experimentally determined. It was established that the activity coefficient of oxygen in liquid iron depends on temperature and on the oxidation potential of the gaseous phase. The lack of proportionality between the oxygen concentration in the metal and its activity in the gaseous phase indicates that with increasing oxygen potential of the gaseous phase the valency of iron increases forming an oxide soluble in the metal.—V. G.

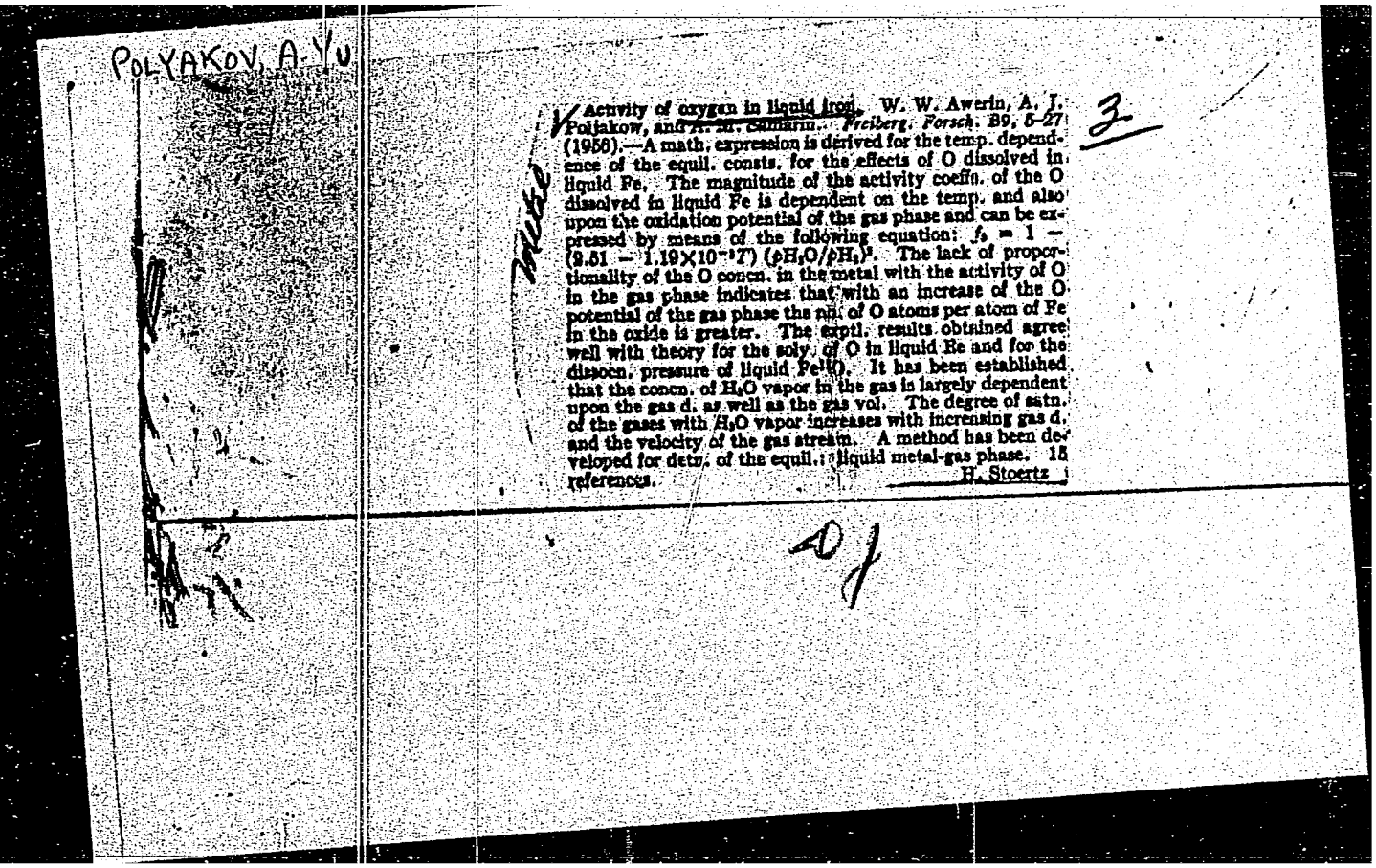
Metal



POLYAKOV, Ir. Yu.

The vacuum reduction of vanadium oxides with carbon. A. Kutsev, V. I. Kashin, M. S. Makunin, A. Yu. Polyakov, and A. M. Samarin. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1956, No. 4, 94–100.—The valuable properties of metallic V could insure its many applications, if a cheaper reduction method than with pure Ca could be found. A thermodynamic examn. of Kroll and Schlechten's oxides reduction with C (*C.A.* 43, 5305e) indicated the possibility of low-C V production by a vacuum reduction at below the m.p. of V (1920°). V_2O_3, obtained by V_2O_5 reduction with H at 500–600°, was used in the preliminary thermographic reduction with C in vacuum. V_2O_3 was powd., mixed with lamp-black, briquetted with glycerol-alc. mixt. as a binder, and the effects of the temp., the vacuum, the C-particle size, C reactivity, etc., were studied. Metallic V production method was developed from the preliminary tests. A table was prepd. of the C and O content of the V obtained, and with C = 0.1–0.25%, O was found to decrease to ~0.1%. At a C content below 0.1% the metal was brittle. The reduction efficiency depends largely on the vacuum pump efficiency, and by increasing the latter, C was reduced to 0.09%, and O to 0.014%. N in the metal is highly detrimental to its plasticity, and by using the vacuum reduction it can be readily reduced to below 0.03%. W. M. Sternberg

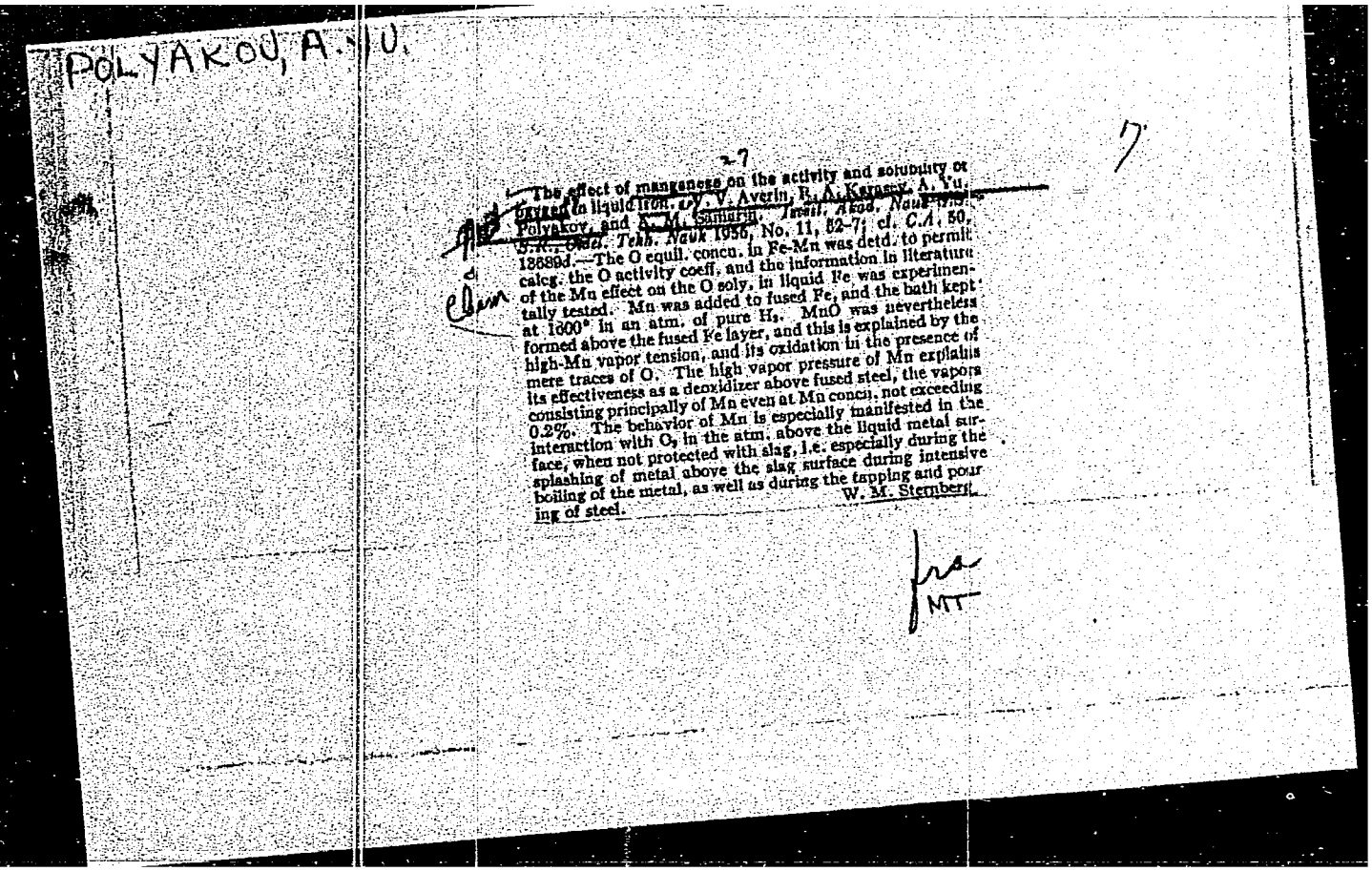
LFH



POLYAKOV, A.YU

Activity of oxygen in liquid iron. W. W. Awerin, A. J. Poljakow, and A. M. Samarin. *Freiberg. Forsch.* B9, 5-27 (1958).—A math. expression is derived for the temp. dependence of the equil. consts. for the effects of O dissolved in liquid Fe. The magnitude of the activity coeffn. of the O dissolved in liquid Fe is dependent on the temp. and also upon the oxidation potential of the gas phase and can be expressed by means of the following equation: $f_o = 1 - (9.51 - 1.19 \times 10^{-3}T)(p_{H_2O}/p_{H_2})^2$. The lack of proportionality of the O concn. in the metal with the activity of O in the gas phase indicates that with an increase of the O potential of the gas phase the no. of O atoms per atom of Fe in the oxide is greater. The exptl. results obtained agree well with theory for the soly. of O in liquid Fe and for the dissocn. pressure of liquid FeO(l). It has been established that the concn. of H_2O vapor in the gas is largely dependent upon the gas d. as well as the gas vol. The degree of satn. of the gases with H_2O vapor increases with increasing gas d. and the velocity of the gas stream. A method has been developed for detn. of the equil. liquid metal-gas phase. 18 references.

H. Stoertz



POLYAKOV, A. Yu.

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The effect of manganese on the activity and solubility of oxygen in liquid iron. A. V. Averin, B. A. Kargaev, A. Yu. Polyakov, and A. M. Samarin. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1956, No. 11, 52-7; cf. *C.A.* 50, 13589d.—The O equil. concn. in Fe-Mn was detd. to permit calcg. the O activity coeff. and the information in literature of the Mn effect on the O soly. in liquid Fe was experimentally tested. Mn was added to fused Fe, and the bath kept at 1600° in an atm. of pure H_2. MnO was nevertheless formed above the fused Fe layer, and this is explained by the high-Mn vapor tension, and its oxidation in the presence of mere traces of O. The high vapor pressure of Mn explains its effectiveness as a deoxidizer above fused steel, the vapors consisting principally of Mn even at Mn concn. not exceeding 0.2%. The behavior of Mn is especially manifested in the interaction with O_2 in the atm. above the liquid metal surface, when not protected with slag, i.e. especially during the splashing of metal above the slag surface during intensive boiling of the metal, as well as during the tapping and pouring of steel.

W. M. Stemberg

fra MIT

Polyakov, A. Yu.

USSR/ Laboratory Equipment. Apparatuses, Their Theory, Construction and Application. I

Abs Jour: Referat. Zhur.-Khimiya, No. 8, 1957, 27354.

Author : V.V. Averin, A. Yu. Polyakov.

Title : Preparation of Steam-Hydrogen Mixtures of Preset Composition.

Orig Pub: Zavod. laboratoriya, 1956, 22, No. 10, 1256 - 1257.

Abstract: A new construction of the saturation instrument was proposed. This instrument serves for the preparation of mixtures of steam and hydrogen of a present composition for the thermodynamic study of the interaction between oxygen and impurities dissolved in liquid and solid metals. The instrument is used together with flow meters and permits the increase of the accuracy of the measurement of the

Card 1/2

Name: POLYAKOV, Aleksandr Yul'yevich

Dissertation: Metallurgy of vanadium

Degree: Doc Tech Sci

Affiliation: [not indicated]

Defense Date, Place: 13 Dec 57, Council of Inst of Metallurgy imeni Baykov of Acad Sci USSR

Certification Date: 7 Sep 57

Source: BMVO 22/57

SAMARIN, Aleksandr Mikhaylovich; POLYAKOV, Aleksandr Yul'yevich; NOVIK, Lev Moiseyevich; GARNYK, Galina Antonovna; ROZENTSVEYG, Ya.D., redaktor izdatel'stva; VAYMSHTEYN, Ye.B., tekhnicheskiy redaktor

[Use of vaccum in steel smelting] Primenenie vakuuma v staleplavil'nykh protsessakh. Pod red. A.M.Samarina. Moskva, Gos. nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1957. 101 p. (MLRA 10:7)

1. Chlen-korrespondent Akademii nauk SSSR (for Samarin)
(Smelting)

POLYAKOV, A.YU., AVERIN, V.V., SAMARIN, A.M.

"
"Solubility and Activity of Oxygen in Liquid Alloys of Fe-Ni-Co,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallury, Moscow, July 1-6, 1957

POLYAKOV, A. Yu.

"Mechanism of Interaction of Vanadium Cast Iron and Gaseous Oxidizer," lecture given at thte Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

POLYAKOV, A.YU., OKOROKOV, G.N., SAMARIN, A.M.

"Influence of the Arc Vacuum Remelting on Properties of Steel and Alloys," lectuee given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

Polyakov, A. Yu.

137-58-5-10757

Translation from: Referativnyy zhurnal, Metallurgiya, 1958 Nr 5 p 269 (USSR)

AUTHOR: Polyakov, A. Yu.

TITLE: Effect of Carbon on the Properties of Stainless Steel (Vliyaniye ugleroda na svoystva nerzhaveyushchey stali)

PERIODICAL: V sb.: Primeneniye vakuuma v staleplav. protsessakh. Moscow, Metallurgizdat, 1957, pp 15-33

ABSTRACT: A description is offered of the properties of mild stainless steel 18-8 and of various methods of producing it. Melting holding for 30-40 min in a 5-20 mm Hg vacuum, and pouring under vacuum of 1Kh18N9T steel reduces the C contents of the steel to 0.01-0.02%, while the losses of Cr do not exceed 4% of the initial content and the Ni contents do not change. The Si, P and S contents revealed no particular change, and the Mn contents dropped by 25-75%. The vacuum treatment of stainless steel reduces the N contents of the steel to 0.01% regardless of the initial content thereof. The O contents rise to 0.02-0.04% owing to the reaction between the steel and the Mg oxide of the lining. When the steel contains 0.02% C, it does not show any tendency to intergranular corrosion. The resistance of such

Card 1/2

137-58-5-10757

Effect of Carbon on the Properties of Stainless Steel

steel to corrosion in HNO_3 is several times higher than that of ordinary 1Kh18N9T steel. The best results are those resulting from vacuum treatment of steel that is free of Ti. To reduce the O contents, vacuum decarburizing of stainless steel should be done in Zr oxide crucibles, while a little ore must be added to reduce the C contents of the charge. The Fe-Cr used should also be decarburized. It is produced by vacuum treatment of briquettes pressed from ground Fe-Cr and oxidizers. Carbon-free Fe-Cr makes it possible to obtain a steel of as little as 0.03% C in open furnaces. This steel is not inferior in quality to steels smelted in vacuum furnaces and contains less O. In nonmetallic inclusions it does not differ from ordinary steel. The cost of steel smelted with carbon-free Fe-Cr does not differ from that of 1Kh18N9T steel. Further improvement in the quality of stainless steel may be accomplished by resmelting low-carbon steel in vacuum arc furnaces with a water-cooled Cu crystallizer, rods of the same steel being used as consumable electrodes. This type of treatment reduces the content of nonmetallic inclusions and gases by 65-95%.

1. Stainless steel--Properties 2. Carbon--Metallurgical effects M.Sh.
3. Stainless steel--Production

Card 2/2

a reaction furnace, where it was heated to the [illegible]
the metal (M). Temperatures were measured by means of an optical pyrometer. Samples of M were withdrawn frequently during the smelting process. After every withdrawal, the con-

Card 1/3

Activity of Oxygen in Liquid Iron

ditions of equilibrium (the temperature and the composition of the gaseous phase) were altered and new samples of M were again taken. From a charge of 70-80 g three to four samples weighing 10-15 g each would be taken. Owing to vigorous separation of the hydrogen, the crystallization of the little ingots was accompanied by effervescence. In order to reduce the partial pressure of H_2, Ar was added to the gaseous mixture. When the O_2 content exceeded 0.1 percent, the surface of the ingot in contact with the crucible became covered with a shiny oxide film. During the solidification of M a portion of the oxygen left with the escaping hydrogen while another portion was deposited on the walls of the crucible together with the waste materials. When smelting was conducted with Ar, the consumption of H_2 and Ar constituted 255 ml/min and 700 ml/min, respectively. Results of experiments in which Fe was saturated with oxygen at temperatures of 1551°, 1574°, 1597°, 1621°, and 1645° closely coincide with known data on the solubility of oxygen in Fe under a layer of liquid, ferruginous slag. Equilibrium constant of the reaction between liquid Fe and the steam-hydrogen mixture is established as a function of temperature:

Card 2/3

137-1958-3-4645

Activity of Oxygen in Liquid Iron

$H_{2(2)} + [O] = H_2O_{(2)}$; $k = 1/[\%\ O]\, f_o \cdot P_{H_2O}/P_{H_2}$;

$\log k = 9440/T - 4.536$

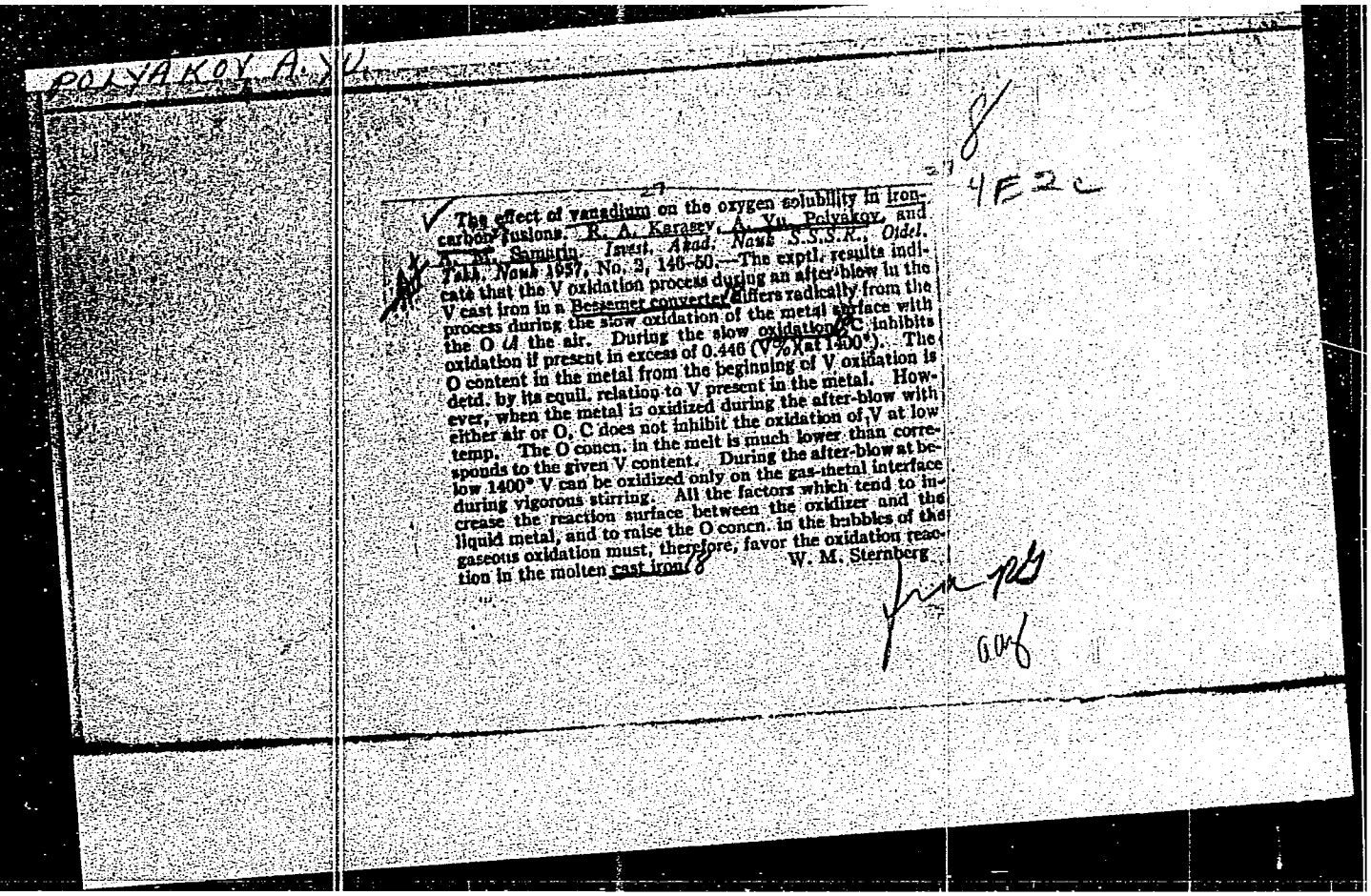
It is established that the magnitude of the coefficient of activity of oxygen in liquid Fe is a function of both the temperature and the oxidation potential of the gaseous phase, and is expressed by the equation:

$f_o = 1 - (2.51 - 1.19 \cdot 10^{-3} T)\ (P_{H_2O}/P_{H_2})^2$, where

$f_o = a_o / [\%\ O]$.

B. L.

Card 3/3



POLYAKOV, A. Yu.

The effect of vanadium on the oxygen solubility in iron-carbon fusions. R. A. Karasev, A. Yu. Polyakov, and A. M. Samarin. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1957, No. 2, 146–50.—The exptl. results indicate that the V oxidation process during an after-blow in the V cast iron in a Bessemer converter differs radically from the process during the slow oxidation of the metal surface with the O of the air. During the slow oxidation C inhibits oxidation if present in excess of 0.446 (V%)(C%) at 1400°. The O content in the metal from the beginning of V oxidation is detd. by its equil. relation to V present in the metal. However, when the metal is oxidized during the after-blow with either air or O_2, C does not inhibit the oxidation of V at low temp. The O concn. in the melt is much lower than corresponds to the given V content. During the after-blow at below 1400° V can be oxidized only on the gas-metal interface during vigorous stirring. All the factors which tend to increase the reaction surface between the oxidizer and the liquid metal, and to raise the O concn. in the bubbles of the gaseous oxidation must, therefore, favor the oxidation reaction in the molten cast iron. W. M. Sternberg

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4F2c

Polyakov A. Yu

137-1958-3-4639

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 3, p 25 (USSR)

AUTHOR: Polyakov, A. Yu.

TITLE: Third Conference on the Physicochemical Principles of Steel Production (Tret'ya konferentsiya po fiziko-khimicheskim osnovam proizvodstva stali)

PERIODICAL: Tr. In-ta metallurgii AN SSSR, 1957, Nr 2, pp 209-216

ABSTRACT: A summary of reports presented at the Third Conference on Physicochemical Principles of Steel Production held in Moscow in January 1955. Future operations planned in this field are presented: intensification of metallurgical processes, improvement of quality of special steels and alloys, adaptation on part of the industry of vacuum furnaces and of furnaces with controlled atmosphere, investigation of processes of casting and solidification of steel, improvement of process-control techniques in the production of steel, and employment of radioactive isotopes in metallurgical research.

B. L.

Card 1/1

AUTHORS: Polyakov, A. Yu. and Rudneva, A.V. (Moscow).

TITLE: Investigation of transformed vanadium slags. (Issledovaniye peredel'nykh vanadiyevykh shlakov). 24-4-7/34

PERIODICAL: "Izv. Ak. Nauk, Otd. Tekh. Nauk" (Bulletin of the Ac. Sc., Technical Sciences Section), 1957, No.4, pp.45-53 (USSR).

ABSTRACT: Belyankin, D. S. and Lapin, V. V. (1) and Umanskiy, Ya.S. et alii (2) established that most of the vanadium present in such slags is contained in a vanadium spinelide, the composition of which is complicated by presence in it of three-charge cathions of Cr, Al and Ti; these cathions substitute isomorphically the ions of vanadium and of the trivalent iron on entering into the lattice of the vanadium spinel. A characteristic feature of the spinelide is its very low solubility in the silicate melt which increases slowly with increasing temperature. The distribution of the vanadium between the spinelide and the alumina containing phases influences the technical and economic indices of vanadium separation from the slags during their chemical processing. Therefore, the authors of this paper considered it of theoretical and practical interest to study the nature of transformed vanadium slags within a wide range of changes in their composition. For the investigations six specimens of slags obtained from experimental blowing of vanadium cast irons produced by the Chusovsk Works and of two specimens obtained in

Card 1/3

Investigation of transformed vanadium slags. (Cont.) 24-4-7/34

experimental blowing of vanadium iron produced from a concentrate of titano-magnetites. The chemical compositions of the investigated slags are given in Table 1, p.45. The main vanadium containing phase (vanadium spinelide) was separated from chemically analysed vanadium slags, according to the technique described by Belyankin (1.) which was then subjected to a complete analysis. The chemical analyses were supervised by A. I. Ponomarev. For all the investigated slags the quantitative mineralogical composition was determined whereby the difference of the data of two calculations usually did not exceed 1 to 2%. The phase composition of vanadium slags was established by mineralogical and X-ray structural tests. Within the investigated compositions (9.92 to 25.75% V_2O_3, 12.25 to 30.40% SiO_2, 0.67 to 21.35% Cr_2O_3) only the vanadium spinelide contains vanadium in the crystalline phase. This conclusion is in full agreement with the results of chemical analyses according to which an extremely low V_2O_3 content in the silicate phases, amounting to 1 - 1.5%, is maintained constant at very low, 12%, as well as very high 30%, of silica in the slag. Thus, the investigated high vanadium low silica content slags have no advantage from the point of view of distribution of the vanadium between the phases compared with low vanadium content

Card 2/3

POLYAKOV, A. Yu.

24-6-4/24

AUTHORS: Polyakov, A. Yu. and Samarin, A.M. (Moscow).

TITLE: Extraction of vanadium from P-content pig iron. (Izvlecheniye vanadiya iz chuguna s vysokim soderzhaniyem fosfora).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.6, pp.18-26 (U.S.S.R.)

ABSTRACT: The present work was carried out in accordance with the plan to broaden the utilisation of ores from the Kerch deposits. In the blowing of phosphorus iron containing about 0.10% vanadium, it is possible to obtain viscous doughy slags containing 3.5% V, even when the iron itself contains only 0.068% V. The concentration of vanadium in the slag increases by a factor of 50 to 60 compared with the concentration in the iron. Irons containing not more than 0.25% Si and up to 1.3 to 1.5% Mn provide slags containing not less than 3% V. If the iron does not contain more than 0.5 to 1.0% Mn then the slag can contain up to 3.5% V. If the iron contains more silicon (0.25 to 0.45%), the vanadium content in the slag will not exceed 2.5%, even when the iron contains less than 0.5% Mn. In blowing a low V content iron and slags with a vanadium content of about 3%, the

Card 1/3

Extraction of vanadium from P-content pig iron. (Cont.)

temperature at the end of the blowing should not exceed 1250 to 1270 C. The phosphorus loss during the devanadation is small and does not exceed 4% of the original P-content; the concentration of P_2O_5 in the slags is 6 to 8%. It was shown that in iron containing 0.26 to 0.41% Si, the removal, during the first few minutes of blowing, of even 40% Si is inevitably accompanied by a simultaneous oxidation of about 35% of the vanadium present in the iron. With an initial vanadium content of 0.08 to 0.10% in the Kerch type of iron, such a loss of vanadium is intolerable. Hence in blowing of iron containing small amounts of vanadium, the only method which allows one to obtain slags containing not less than 3 to 3.5% V is the limitation of the silicon content to 0.25%, and the manganese content to 1%. Other results which were obtained are as follows. In the blowing of iron containing only 0.17% V it is possible to obtain slags containing up to 10% V, if the silicon content of the iron is a few hundredths of a percent and the manganese content is not more than 0.5%. If the iron contains 0.13 to 0.17% V, not more than 0.40% Si and 0.30 to 0.60% Mn, the slags contain 4.5 to 6.2% V. Tables 1 to 6 summarise such results in the various cases investigated. All the

Extraction of vanadium from P-content pig iron. (Cont.)

results indicate that it is possible to obtain slags containing 3 to 3.5% V in blowing of phosphorous irons containing 0.08 to 0.10% V if:
the Si content is not more than 0.25% and Mn content not more than 1%;
a low temperature is maintained during the process of blowing;
SiO_2 and CaO are eliminated from the slag.
Methods whereby this can be achieved are briefly mentioned.
There are 2 figures, 7 tables and one Slavic reference.

SUBMITTED: November 29, 1956.

AVAILABLE:

Card 3/3

POLYAKOV, A. YU.

24-8-16/34

AUTHORS: Averin, V.V., Polyakov, A. Yu. and Samarin, A.M.(Moscow).

TITLE: Solubility and activity of oxygen in liquid iron, nickel, cobalt and their alloys. (Rastvorimost' i aktivnost' kisloroda v zhidkikh zheleze, nikele, kobal'te i ikh splavakh).

PERIODICAL: "Izvestiya Akademii Nauk,Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.8, pp. 120-122 (U.S.S.R.)

ABSTRACT: Wriedt, H.A. and Chipman, J. (1,3) and one of the authors of this paper (2) studied the solubility of oxygen in liquid melts of iron and nickel in the entire range of concentrations of the two components but they did not study the problems relating to the activity of the oxygen in liquid iron-nickel solutions. In this paper the solubility and the activity of oxygen are studied in the system Fe-Ni-Co by means of investigating the equilibrium between the metallic melt and the gaseous phase for a given value of oxygen activity. In liquid Fe-Co and Fe-Ni melts the oxygen saturation will have a minimum value for high contents of nickel and cobalt. In nickel and cobalt alloys there is no minimum oxygen solubility, however, even in these alloys no proportionality is observed between the saturated oxygen concentrations and

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ACCESSION NR: AT4033718 S/0000/64/000/000/0066/0071

AUTHOR: Makunin, M. S.; Polyakov, A. Yu.

TITLE: A study of carbon reduction of vanadium oxides in a vacuum

SOURCE: USSR. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali. Fiziko-khimicheskiye osnovy* metallurgicheskikh protessov (Physico-chemical basis of metallurgical processes); sbornik statey. Moscow, Metallurgizdat, 1964, 66-71

TOPIC TAGS: vanadium, vanadium oxide, vanadium trioxide reduction, vanadium oxide carbon reduction, carbon reduction process, vanadium reduction kinetics

ABSTRACT: Experiments were carried out at the Institut metallurgii im. A. A. Baykova (Metallurgical Institute) under the guidance of A. M. Samarin (Corr. member of the AN SSSR) to develop techniques for producing ductile vanadium by the carbon reduction of its oxides at temperatures below the metal's melting point. Special equipment (see Fig. 1 in the Enclosure) and the experimental procedures are described. For the range of 900 to 1600C and 10^{-1} to 10^{-3} mm Hg, the process involves two stages: development of an oxycarbide system, followed by a reaction between the lower oxides and carbides of

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ACCESSION NR: AT4033718

vanadium. The first stage can be carried out at temperatures not exceeding 1300C and pressures obtainable with a force pump (reduction level 60 to 70%). The oxycarbide system is then subjected to further reduction, the temperature gradually increasing to 1600C, and the pressure decreasing to 10^{-3} mm Hg. The resulting spongy vanadium contains about 1% each of C and O. Further refining required the renewal of the reaction surface (grinding and reforming of briquets) and processing in high temperature vacuum ovens (near 1700°C, 10^{-3} to $5 \cdot 10^{-4}$ mm Hg). The final metal was ductile. Orig. art. has: 2 graphs and 1 illustration.

ASSOCIATION: Komissiya po fiziko-khimicheskim osnovam proizvodstva stali (Committee on the Physico-Chemical Basis of Steel Production)

SUBMITTED: 18Oct63 DATE ACQ: 16Apr64 ENCL: 01

SUB CODE: ML NO REF SOV: 004 OTHER: 001

Card 2/3

ACCESSION NR: AT4033718

ENCLOSURE: 01

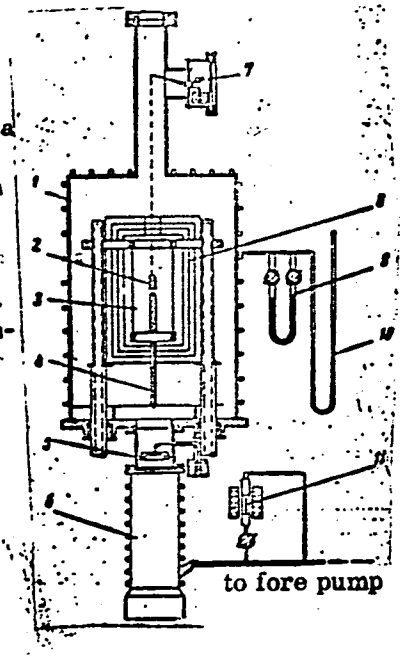

Figure 1. Equipment for a study of kinetics of carbon reduction of vanadium oxides

1-oven housing 2-test piece 3-heater 4-thermocouple 5-pressure regulator 6-diffusion pump 7-scales 8-tap system 9-pressure regulator switch 10-mercury pressure gauge 11-pressure regulator valve

3/3

SUBBOTA, M., slesar' (Prokhladnyy, Kabardino-Balkarskaya ASSR); POLYAKOV, I., mekhanik (Sverdlovsk); KOLESNIK, G., elektroslesar' (Dnepropetrovsk); CHEKHOV, V. (Leningrad); KALIMOV, V. (Leningrad)

Conceived, achieved. Izobr.i rats. no.4:10 '64. (MIRA 17:4)

PYATKIN, A.M., kand. tekhn. nauk; POLYAKOV, P.I., inzh.; DUDNIK, T.M., dotsent, kand. tekhn. nauk; KHOKHLOV, N.P., inzh.; ASTAKHOV, A.S.

Readers' response to the article by A.S. Astakhov "Economic efficiency of mining machinery."; "Ugol'", 1962, No.12.
Ugol' 39 no.3:65-68 My'64. (MIRA 17:5)

POLYAKOV, A. YU.

AUTHOR: Not given PA - 2874

TITLE: Dissertations (July-December 1956)
Department of Technical Sciences (Otdeleniie tekhnicheskikh nauk, Russian)

PERIODICAL: Vestnik Akademii Nauk SSSR, 1957, Vol 27, Nr 4, pp 132-133 (U.S.S.R.)

Received: 5 / 1957 Reviewed: 7 / 1957

ABSTRACT: The following dissertations were held at the Mining Institute:

V.G.DERKACH: "On the Causes of the Process of Magnetic Enrichment of Weakly Magnetic Ores". In the course of this dissertation the mathematical dependences existing in connection with the characteristic features of the processes of magnetic separation were determined.

M.M.CHESNOKOV: "On the Investigation of Rational Methods for the Utilization of Granite Deposits for the Production of Piece Material".

In the Institute for Complex Transport Problems:

N.S.ZURKOV: "The Investigation of the Influence of the Proper Utilization of Transshipment- and Reloading Points".

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PA - 2874

Dissertations (July-December 1956)

At the Institute for Metallurgy:

S.M.ANDONIEV: "The Evaporating Cooling of Metallurgical Furnaces".

A.J.POLIAKOV: "The Physical-Chemical Rules governing the Production of Vanadium from Castings containing Vanadium".

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

Polyakov A. Yu.

Use of Vacuum in Metallurgy. Moscow, Izd-vo AN SSSR, 1958 165pp. (ed. SAMARIN, A. M.)
Tran . of a Conf. on above, (Inst. Metallurgy, AN SSSR)

Polyakov, A.Yu. The Vacuum Method of Obtaining Ductile Vanadium 147
The author describes a method for obtaining ductile vanadium by reducing the trioxide with carbon in a vacuum at temperatures below the melting point of the metal. The vanadium is plastic at room temperature and contains a maximum of 0.03 per cent of nitrogen and 0.10-0.30 percent of carbon. The method is said to be suitable for use in industry. A vacuum of close to 0.0004 mm. of mercury is required. There are 8 English references.

Bezobrazov, S.V. Preparation of Carbon-free Ferrochrome by Decarbonizing Carbonaceous Ferrochrome in Vacuum 155
Authors conclusions: 1. The use of vacuum furnaces makes it possible to obtain ferrochrome with a carbon content of 0.01-0.03 percent by decarbonizing high-carbon ferrochrome with the oxygen of chromic oxide, chrome ore, quartzite, and nickel monoxide. 2. The new grade of ferrochrome can be produced at temperatures of 1100-1200° C. and at a final pressure in the system of $5\text{-}1\cdot10^{-2}$ mm. of mercury. 3. Some advantages of the method are: (a) the product has a lower-than-usual carbon content (b) more chromium is extracted from the ore (c) melting of silico-chrome as an

Card 14/16

intermediate step is obviated. (There are 2 English references)

Khodkin, V.M. (Address) 163

Khodkin briefly describes the method out by TsNIIChM (Central Scientific Research Institute of Ferrous Metallurgy) for preparing carbon-free ferrochrome.

Resolution of the Conference on the Use of Vacuum in Metallurgy, Convened by the Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences, USSR (unanimously adopted March 29, 1956) 165

The numerous advantages of vacuum metallurgy, particularly in the production of steel and ferroalloys, are recapitulated. In connection with the directives of the Twentieth Congress of the Communist Party of the Soviet Union to expand the vacuum melting and teeming of steel during the period 1956-60, it is recommended that these techniques be introduced or further developed at a number of plants, including "Dneprospetsstal'", Kuznetsk Metallurgical Plant, Verkh-Isetskiy Metallurgical Plant, Chelyabinsk Metallurgical Plant, Zaporzh'ye Ferroalloys Plant, Urals Heavy-Machinery Plant, "Bol'shevik" Plant, "Serp i Molot" Plant, and Plant imeni Dzerzhinsky.

The limited output of the necessary equipment and the need for improving existing designs are pointed out. The need for intensive research is indicated, and specific fields of investigation are recommended.

AVAILABLE: Library of Congress

Card 16/16

GO/mas
10-21-58

POLYAKOV, A. Yu.

OKOROKOV, G. N., POLYAKOV, A. Yu. and SAMARIN, A. M.
Inst. of Metallurgy im. Baykov, Moscow.

"Consumable Electrode Arc Melting of Ball-bearing Steels."

paper presented at Second Symposium on the Application of Vacuum in Metallurgy.

Moscow, 1-6 July 1958

POLYAKOV, A. Yu.

MAKUNIN, M. S., POLYAKOV, A. Yu. and SAMARIN, A. M.
Institute Metallurgy im. A. A. Baykov

"Properties of Vanadium Obtained by Carbon Reduction in Vacuum."

paper presented at Second Symposium on the Application of Vacuum Metallurgy.

Moscow, 1-6 July 1958

POLYAKOV, A. Yu.

POLYAKOV, A. Yu

LEONIDOV, N.K.

25(5) PHASE I BOOK EXPLOITATION SOV/1497

Akademiya nauk SSSR. Institut nauchnoy i tekhnicheskoy informatsii

Metallurgiya SSSR, 1917-1957, t. 1 (Metallurgy of the USSR, 1917 - 1957, Vol. 1) Moscow, Metallurgizdat, 1958. 745 p. 3,000 copies printed.

Ed. (title page): I. P. Bardin, Academician; Ed. (Inside book): [illegible]; Tech. Ed.: O. G. Bekker.

PURPOSE: The book is intended for scientific workers and engineers in metallurgical plants and in the machine-building industry It may also be used by students in advanced courses in metallurgical vuzes.

COVERAGE: This collection of articles covers extensively practical and theoretical developments in Soviet metallurgy during the last 40 years. The material deals with the discovery and development of the major ore deposits and the growth of the metal industry in various parts of European and Asiatic USSR. Research institutes, laboratories, their location, and the names of the scientists and engineers involved are listed. Many papers contain so many references and names of various personalities that it was considered beyond the scope of the coverage of each article to list them. The authors claim that the processes, methods and theories described in this book reflect the most recent developments in Soviet metallurgy.

Card 1/21

Metallurgy of the USSR (Cont.) SOV/1497

Tsylev, L.M., and M.Ya. Ostroukhov. Development in the USSR of the Theory of Blast Furnace Process 147

The article deals with the design and operation of very large blast furnaces with 950 to 1300 cubic meter capacity. A number of experiments were carried out to study the operating regimes in those furnaces. The physical and chemical characteristics of the charge were studied to obtain optimum results and to insure free travel of the charge in the furnace and the permeability of the charge to gases. The thermal reactions were investigated and the results graphed. Reduction and slag formation as well as the combustion process proper were the object of intensive studies. The need for the proper control of blast furnace operation is stressed. It is claimed that at present Soviet scientists are attempting to develop a fully automated system for blast furnace operation which will automatically compensate for the variables involved in the process. There are 46 Soviet and 3 English references.

Polyakov, A.Yu., and A.M. Samarin. The Rise of Steel Production in the USSR 187

The article contains a review of the Soviet steel industry. Production figures for the Five Year Plans are given. The use of oxygen blowing in the production of converter steel is regarded as an important develop-

Metallurgy of the USSR (Cont.) SOV/1497

ment. A marked increase in the production of alloyed steel is scheduled for 1960. The development of automated processes in foundries is advocated. There are 4 Soviet references.

Polyakov, A.Yu., and A.M. Samarin. Development of the Theoretical Principles of Steel making 350

Soviet scientists are reported to have done extensive theoretical studies of the physical and chemical processes which take place in the liquid stage of steel making. Reaction between oxygen and carbon in the steel bath has been the subject of numerous studies. The thermodynamic and

Metallurgy of the USSR (Cont.) SOV/1497

kinetic behavior of slags and metal has also been studied. The present trend is to apply new scientific achievements in physics and electronics to control and check steel making processes by a fully automatic system on an industrial scale. There are 50 Soviet references.

POLYAKOV, A. YU.

18(0) PHASE I BOOK EXPLOITATION SOV/1728

Akademiya nauk SSSR. Institut metallurgii

Sovremennyye problemy metallurgii (Modern Problems in Metallurgy) Moscow, Izd-vo AN SSSR, 1958. 640 p. 3,000 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Eds. of Publishing House: V.S. Rzhevnikov, and A.L. Bankvitser; Tech. Ed.: T.V. Polyakova.

PURPOSE: This book is intended for scientific and technical personnel in the field of metallurgy.

COVERAGE: This is a collection of articles on certain aspects of Soviet metallurgy. The book is dedicated to Academician Ivan Pavlovich Bardin on the occasion of his 75th birthday. The book is divided into seven parts. The first part consists of two articles presenting a brief account of the biography and professional activity of the Soviet metallurgist. It includes an article by John Chipman, Nicholas Grant, and John Elliott (M.I.T., USA) describing their meeting with Bardin in Moscow and also his visit to the United States. The second part consists of three articles and deals with raw materials and fuels for the Soviet metallurgical industry. The third part represents the major portion of the book. It consists of 25 articles dealing with the various aspects of the metallurgy of pig iron and steel. The fourth part consists of two articles treating the metallurgy of nonferrous metals. The fifth part consists of three articles on the forming of metals. The sixth part consists of eight articles discussing certain aspects of physical metallurgy. The last part deals with general problems in the field of metallurgy. References are given after each article. No personalities are mentioned.

TABLE OF CONTENTS:

Modern Problems in Metallurgy SOV/1728

Card 8/12

SOV/24-58-5-10/31

AUTHORS: Okorokov, G. N., Polyakov, A. Yu. and Samarin, A.M. (Moscow)

TITLE: Repeated Meltings of Steel and Alloys in an Arc-Vacuum Furnace (Pereplav stali i splavov v dugovoy vakuumnoy pechi)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 5, pp 59-62 (USSR)

ABSTRACT: A considerable reduction of gas contents and non-metallic impurities in steel and alloys has been obtained by remelting in a special arc-vacuum furnace constructed in the Metallurgical Institute of the Ac.Sc. USSR, a sketch of which is shown on p 60. Ten remeltings of ball-bearing steel under 1 x 10^{-1} mm pressure of mercury at the rate of 0.6 kg/min resulted in a reduction of oxide and sulphide contents by 40-50%. The same steady 40-50% reduction of oxides and sulphides has been obtained after a series of remeltings (under 1 x 10^{-3} to 1 x 10^{-4} mm pressure) of steel, previously rejected because of its high contents of non-metallic impurities. After remeltings it proved in many ways superior to the steel specially selected for ball-

Card 1/2

Repeated Meltings of Steel and Alloys in an Arc-Vacuum Furnace

bearing production. Similarly, heat resisting nickel alloys, after four remeltings in the arc-vacuum furnace (at the rate of 0.5 to 0.55 kg/min) had a surface of good quality and a high homogeneity, without the undercrust porosity peculiar to titanium containing alloys. No change in the chemical composition took place as a result of the evaporation in vacuum, except that the contents of oxygen were reduced by 50-70%, that of nitrogen by 25-30%; the carbon content remained unchanged. Similar results have been obtained with stainless steel, remelted at the rate of 0.6 kg/min under 1 x 10^{-3} and 1 x 10^{-4} mm pressure, applying a current intensity of 1500 A.
There are 5 tables, 1 figure and 1 Soviet reference.

SUBMITTED: November 11, 1957

Card 2/2

SHARF, G., inzh.; AVERIN, V.V., kand.tekhn.nauk; POLYAKOV, A.Yu., prof., doktor tekhn.nauk; SAMARIN, A.M., prof.

Effect of silicon on the solubility and activity of oxygen in liquid nickel. Izv.vys.ucheb.zav.; chern.met. no.11:29-36 N '58. (MIRA 12:1)

1. Institut metallurgii imeni Baykova. 2. Chlen-korrespondent AN SSSR (for Samarin).

(Nickel alloys--Metallurgy)
(Silicon)

POLYAKOV, A. Yu.

ДЕГАЗАЦИЯ СТАЛИ И СПЛАВОВ

М.А.Шумихин П.В.Гельд Ф.А.Сафронов	Некоторые особенности процесса раскисления ферросплавов.
Р.А.Гобов П.В.Гельд	Влияние углерода на водопроницаемость стали.
Г.Н.Окороков А.Ю.Поляков А.М.Самарин	Особенности раскисления стали при вакуумной обработке.
А.М.Самарин М.П.Кузнецов Л.П.Ульянов Л.М.Попов А.Н.Арутюнов	Повышение качества бессемеровских рельсов методом вакуумной обработки в ковше.
Г.Н.Окороков Н.Н.Авшаров Г.А.Соколов В.И.Данилов В.А.Кожевин	Новое механическое производство малоуглеродистой стали с применением вакуума.
Г.В.Агеев Б.Г.Чернов	Влияние вакуумирования на поведение кислорода в стали при выпуске его в вакуум.
И.В.Попов В.Н.Сергеевский	Влияние технологических факторов вакуумной дуговой плавки на газонасыщенность слитков и качество поверхности стали.
Т.М.Воробьева И.П.Бобырев Е. С.Каменецкая	Влияние вакуумирования при выплавке на свойства и сварку по качеству стали ЭИ67ГСНА.

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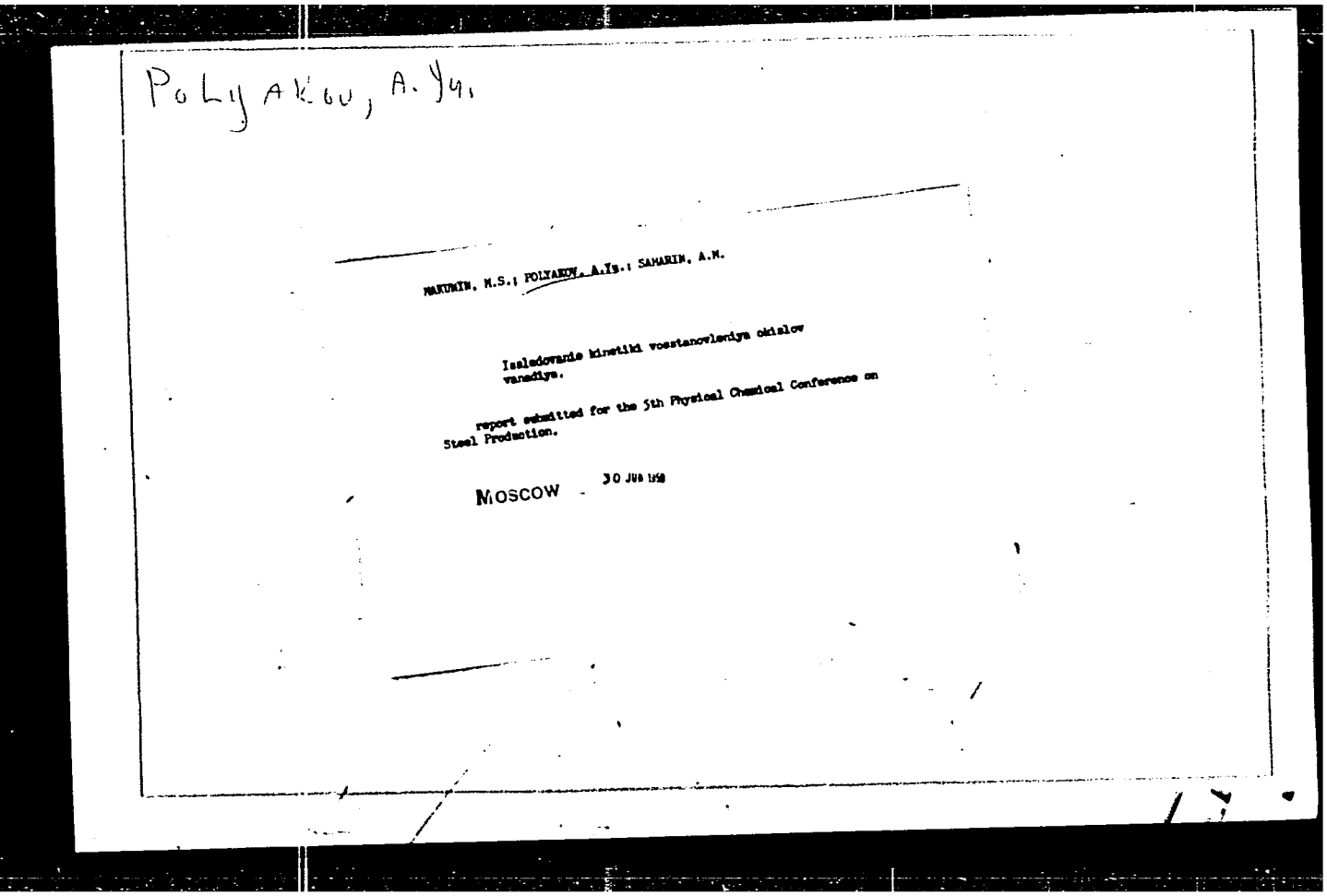
report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow-- 30 Jun 1959.



Poliyakov, A. Ya.

MAKUMIN, M.S.; POLYAKOV, A.Ya.; SAMARIN, A.M.

Issledovanie kinetiki vosstanovleniya okislov vanadiya.

report submitted for the 5th Physical Chemical Conference on Steel Production.

MOSCOW - 30 JUN 1958

ACCESSION NR: AP4029830 S/0279/64/000/002/0017/0025

AUTHOR: Hsu, Chia-lung (Moscow); Polyakov, A. Yu. (Moscow); Samarin, A. M. (Moscow)

TITLE: The influence of a vacuum on increasing the reduction capacity of carbon in iron-carbon melts

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 2, 1964, 17-25

TOPIC TAGS: reducing capability, carbon, iron, carbon monoxide, argon

ABSTRACT: The authors studied possible limits of equilibrium shift of the reciprocal reaction of carbon and oxygen dissolved in liquid iron by lowering the partial carbon monoxide pressure above the liquid metal by means of diluting it with an inert gas and maintaining the total pressure of the gas mixture in the furnace atmosphere close to 1 atmos. It is expedient to investigate the effect of lowering the partial monoxide pressure above the liquid tank, as well as bubbling an inert gas through it. The results in both cases compared with samples of metal obtained under vacuum melting conditions. The authors concluded that: the study of equilibrium conditions of the reciprocal reaction of carbon and oxygen dissolved in liquid iron under various partial pressures of carbon monoxide in gaseous phase and under general pressure of the gas mixtures $P_{CO}+P_{Ar}$ is on the order of 1 atmos. It was established that a

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ACCESSION NR: AP4029830

a decrease in the values of p_{CO} in the gaseous phase is accomplished by an equilibrium shift in the direction of increasing the reduction capacity of carbon, similar to a melt under vacuum conditions. The degree of the thermodynamic factor (p_{CO} above the tank) is defined by the value of the specific surface of the division liquid metal-gaseous phase, the degree of roughness of the crucible walls' infusible lining, and other specific conditions of the experiment. Bubbling an inert gas through a metal increases the reduction capacity of carbon in liquid alloys within the same limits as a vacuum melt. For iron-carbon alloys containing more than 1% carbon, the degree of deoxidation was higher in comparison with the melt under vacuum conditions. Orig. art. has: 2 tables, 5 figures and 6 formulas.

ASSOCIATION: none

SUBMITTED: 03May63 DATE ACQ: 30Apr63 ENCL: 00

SUB CODE: ML NO REF SOV: 005 OTHER: 000

Card 2/2

TSZEI-TSZI, Syu; POLYAKOV, A.Yu.; SAMARIN, A.M.

Determination of the activity of components in liquid alloys by the vacuum evaporation method.

report submitted for the 5th Physical Chemical Conference on Steel Production.

Moscow 30 JUN 1959

18(5,6,7) PHASE I BOOK EXPLOITATION SOV/3210

Polyakov, Aleksandr Yul'yevich

Osnovy metallurgii vanadiya (Fundamentals of Vanadium Metallurgy) Moscow, Metallurgizdat, 1959. 137 p. Errata slip inserted. 2,900 copies printed.

Ed.: M. A. Maurakh; Ed. of Publishing House: Ye. I. Levit; Tech. Ed.: P. G. Islent'yeva.

PURPOSE: This book is intended for production engineers, laboratory workers, and designers in the metallurgical industry. It may also be useful to students of schools of higher education.

COVERAGE: Historical data are given on vanadium and on the treatment of vanadiferous iron ores in the Soviet Union. Fields of application and properties of vanadium are discussed. The ore reserves of the USSR are dealt with, and principles of extracting vanadium from iron ore are explained. Information is given on the production and forming of ductile vanadium together with recommendations for its production on an industrial scale. The author thanks the following persons for their assistance in preparing the manuscript: A. M. Samarin, Corresponding Member,

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Fundamentals of Vanadium Metallurgy SOV/3210

Academy of Sciences, USSR; G. P. Zabaluyev, S. I. Sapiro, I. F. Krasnykh, M. S. Makunin, and V. M. Pobegaylo, Engineers; N. M. Kokareko, A. V. Rudneva, R. A. Karasev, and N.P. Levents, Candidates of Sciences; and I. L. Lur'ye and M. A. Maurakh, Candidates of Technical Sciences. There are 71 references: 29 Soviet, 31 English, 9 German, 1 Swedish, and 1 French.

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Fundamentals of Vanadium Metallurgy SOV/3210

AVAILABLE: Library of Congress

Card 4/4

VK/os
3/17/60

FILIPPOV, S.I.

FILIPP'OV, Sergey Ivanovich; ARSENT'YEV, Petr Pavlovich; YAKOVLEV, Valentin Viktorovich; POLYAKOV, A.Yu., retsenzent; KAZACHKOV, Ye.A., nauchnyy red.; YABLONSKAYA, L.V., red.izd-va; ISLENT'YEVA, P.G., tekhn.red.

[Converter smelting of steel] Konverternaia plavka stali. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1959. 432 p. (MIRA 12:6)
(Smelting) (Steel--Metallurgy)

SOV/180-59-1-4/29

AUTHORS: Averin, V.V., Polyakov, A.Yu. and Samarin, A.M. (Moscow)

TITLE: Solubility and Activity of Oxygen in Metallic Melts (Rastvorimost' i aktivnost' kisloroda v metallicheskikh rasplavakh)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 1, pp 13-21 (USSR)

ABSTRACT: The authors consider that the published attempts (Refs 1 and 2) to generalize the available experimental material on the activity of oxygen in iron and its alloys fail to elucidate changes in oxygen-activity and solubility. They give their own critical survey of the literature, as well as some unpublished data (V.A.Sarankin), from which they draw the following main conclusions. The solubility and activity of oxygen in metallic systems do not change additively over the whole concentration range of the components but depend on the composition of the oxide phase in equilibrium with the alloy of given composition. The composition of this phase depends mainly on the ratio of dissociation pressures of the components and to a lesser extent deviations from ideal-solutions laws. From experimental data on the activity of oxygen

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Solubility and Activity of Oxygen in Metallic Melts

in alloys the probable oxygen partial pressure for a saturated solution of oxygen in the pure component for the same temperature can be found approximately. This possibility is limited to solutions with similar component properties and for which the oxygen solubility and activity are proportional to concentration in the part of the solubility curve to the right of the minimum, eg Ni-Fe and Co-Fe from the minimum on the curve to pure iron and Fe-Cr from 12 to 100% Cr. The results examined point to a change in the activity of oxygen from the partial pressure corresponding to the saturated solution in one component to that for the other component at the same temperature. The main factor influencing the solubility of oxygen in alloys is the ratio between the dissociation pressures of the oxides of the components but the solubility of oxygen in the pure components and the interaction of components in the metallic and oxide phases also have significant effects. When a considerable difference exists between the dissociation pressures of the component oxides as, for example, in solutions of deoxidizers in iron, the addition of the deoxidizer

Solubility and Activity of Oxygen in Metallic Melts

quickly reduces oxygen solubility because of the reduction in the oxygen partial pressure over the oxide phase formed. If the deoxidizer when its concentration is increased can form compounds with iron stable above their melting points, the further course of the oxygen-solubility curve will depend on the solubility of oxygen in the compound and the individual properties of the deoxidizer will appear in the composition range from the chemical compound to the pure deoxidizer. The change in the activity of oxygen in these composition ranges must similarly depend on the nature of the interaction between the component atoms.

Card 3/3 There are 3 figures, 3 tables and 13 references, 9 of which are Soviet, 3 English and 1 German.

SUBMITTED: June 23, 1958

18(3)

SOV/148-59-1-3/19

AUTHORS: Samarin, A.M., Professor, Corresponding Member of AS USSR; Polyakov, A.Yu., Doctor of Technical Sciences, Docent; Levenets, N.P., Candidate of Technical Sciences; and Pobeguylo, V.M., Engineer

TITLE: Development of an Efficient Technology for the Reduction of Kerch' Cast Iron (Razrabotka ratsional'noy tekhnologii peredela kerchenskikh chugunov)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Chernaya metallurgiya, 1959, Nr 1, pp 23-34 (USSR)

ABSTRACT: Experiments were carried out at the Institute of Metallurgy imeni A.A. Baykov for the purpose of finding an efficient technology of cast iron reduction permitting to obtain high-quality reduction products, such as steel with a low nitrogen and phosphorus content, vanadium slags with a high vanadium content and phosphate slags with a high phosphorus concentration. The cast iron reduction is planned to be carried out in two stages: by low temperature air blowing-through of the cast iron, for the purpose of vanadium and silicon extraction, and by high-temperature oxygen blowing-through of the semi-

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